

# Society for Developmental Biology 62nd Annual Meeting

*Jointly with the International Society of Developmental Biologists*

**July 30 - August 3, 2003**

Marriott Copley Place, Boston, MA

## PROGRAM

**Organizers:** Ruth Lehmann (Chair, SDB President), Eddy De Robertis (ISDB President), Philip Benfey, Steve Burden, Marc Kirschner, Doug Melton, Lee Niswander, Gary Ruvkun, Alex Schier

*Abstract numbers in bold italics.* Underlined names indicate speakers.

### Wednesday, July 30th

#### **1–5:30 pm: Education Symposium**      Salons A–E

1–3:15 pm: Teaching Developmental Biology in Different Environments

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|-----------------|------|--|
|                 | 1:00 | Chair: Karen Crawford, St. Mary Coll. of Maryland, SDB Professional Development and Education Committee Chair - Welcome  |
| <b><i>1</i></b> | 1:05 | International perspectives on today's key issues for the classroom teaching of Developmental Biology. <u>G.M. Malacinski</u> . Indiana Univ. (Twenty-minute talks followed by Roundtable Discussion)   |
| <b><i>2</i></b> | 1:25 | Doing it right: an intense 2-day multifaceted developmental biology laboratory course for 3rd year undergraduates at the Univ. of Bordeaux, France. <u>N. Thézé</u> . Univ. Victor Segalen Bordeaux, Unité INSERM, Av. du Haut-Livique Pessac, France. |
| <b><i>3</i></b> | 1:45 | Beginning at the end: a developmental biology course at the Univ. of Pisa (Italy) which begins with <i>Drosophila</i> molecular genetics. <u>R. Vignali</u> . Univ. di Pisa, Dept. di Fisiol. e Biochimica, via G. Carducci, Ghezzano (Pisa), Italy.   |
| <b><i>4</i></b> | 2:05 | Novel ways student engagement is achieved in the developmental biology classroom at the Univ. of Queensland (Australia). <u>V. Nurcombe</u> and B. Key. Sch. of BioMed. Sci., Univ. of Queensland, St Lucia, Australia.                                |
| <b><i>5</i></b> | 2:25 | Respecting the personal sensitivities of students in modern biology courses in Izmir, Turkey. <u>I. Yilmaz</u> . Dokuz Eylul Univ., Buca Fac. of Edu., Izmir, Turkey.  |
| <b><i>6</i></b> | 2:45 | Developmental biology teaching as part of the strategy of Singapore to achieve world-class status as a biotechnology center. <u>T. Lim</u> . Natl. Univ. of Singapore.   |

3:15–4:45 pm: Break at Posters

3:15–4:30 pm: Education Poster Session and Resource Booth      University Hall

Education Resource Booth – Organizer: Diana Darnell, Lake Forest Coll.

Education posters are listed in Poster Session I and remain in exhibit through Poster Session I. Education poster authors present posters at this session, as well as at the times assigned for Poster Session I.

4:30–5:30 pm: Victor Hamburger Outstanding Educator Lecture      Salons A–E

4:30      Ruth Lehmann, SDB President – Award presentation to Lewis Wolpert

7      4:35      Embryonic problems: science, the public, and ethics. L. Wolpert. Univ. Coll. London, U.K.

5:50 pm: Dinner on each own

## **7–9 pm: Presidential Symposium      Salons A–E**

Chair: Ruth Lehmann, Skirball Inst./NYU

7:00      How cells compute. Sydney Brenner, Salk

7:45      Genes, cells and hormones that influence the lifespan of *C. elegans*. Cynthia Kenyon, UCSF

8:20      Molecular study of olfactory function and development, one neuron at a time. Catherine Dulac, Harvard

## **9–11pm: Opening Reception and Poster Session I      University Hall**

Numbers in *italics* indicate Program Abstract number. **B** numbers indicate poster board number.

Odd number board authors present posters on 7/30, 9–11pm.

Even number board authors present posters on 7/31, 9–11pm.

### **Education**

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|-----------|----|--|
| <b>8</b>  | B1 | Breathing new life into the life sciences: teaching hands-on developmental biology with axolotl embryos. J.M. Gresens. Indiana Univ. Axolotl Colony.   |
| <b>9</b>  | B2 | Using human adult mesenchymal stem cells in an undergraduate teaching laboratory. J. Doctor. Duquesne Univ., Pittsburgh, PA.   |
| <b>10</b> | B3 | The effect of therapeutic ultrasound on the electrophysiological parameters and the morphology of frog skin. M.M. Naidu, C.E. Goodman, S.R. Jalickee, D. Tiburtius and M.A. Dinno. East Carolina Univ. |
| <b>11</b> | B4 | Undergraduate curriculum reform: integrative biology and thematic, inquiry-based laboratories. C.A. Hurney. James Madison Univ.  |
| <b>12</b> | B5 | The more inclusive course proposed in 2002 and executed in 2003. J.E. Heady. Univ. of Michigan-Dearborn.   |
| <b>13</b> | B6 | Vade Mecum2: educational multimedia for developmental biology. M.S. Tyler and R.N. Kozlowski. Univ. of Maine.  |
| <b>14</b> | B7 | Expanding the definition of “good science”: incorporating discussion of ethics and public policy into the standard science curriculum. M.K. Montgomery. Macalester Col., St. Paul, MN.                 |

- 15 B8 Current events in biology: a non-majors course taught by postdocs and graduate students. S.E. Bondos. Rice Univ., Houston, TX.
- 16 B9 Teaching scientists to teach: lessons from the FIRST program. A.R. Morris, D. Eaton, A. Eisen, R. Gunn and J.K. Haynes. Emory Univ. Sch. of Med. and Morehouse Col., Atlanta, GA.
- 17 B10 Thomas Jefferson Univ. Science Outreach Program: bringing live science to the community. J.R. Schaefer and S.A. Farber. Thomas Jefferson Univ.
- 18 B11 Gametes, fertilization, and embryogenesis come alive—biology: exploring life promises true interactivity. J. McLaughlin and R. Heyden. Pennsylvania State Univ., Berks-Lehigh Valley College.

## Development and Evolution

- 19 B12 Cell-cell interactions in the patterning of the rostral segments in the leech. D-H. Kuo and M. Shankland. Univ. of Texas at Austin.
- 20 B13 Anterior-posterior axis specification in insects. Is it chiseled in stone? V. Zhurov and M. Grbic. Univ. of Western Ontario, London, Ontario Canada.
- 21 B14 Functional comparative analyses of *otd/otx* genes in anterior development. E.A. Wimmer, B.G.M. Schmid, K. Meier and J. Reischl. Univ. Bayreuth, Germany.
- 22 B15 The molecular mechanisms underlying the establishment of the dorsal/ventral axis in the chaetognath, *Flaccisagitta enflata*. D.Q. Matus and M.Q. Martindale. Univ. of Hawaii at Manoa.
- 23 B16 Segments & joints: patterning the segmenting vertebrate skeleton. P.L. Crotwell and P.M. Mabee. Univ. of South Dakota, Vermillion.
- 24 B17 Patterning a feather: a tale of two keratins. P. Maderson. Brooklyn Col. of CUNY.
- 25 B18 Pleiotropic tradeoff during blind cavefish evolution and development. Y. Yamamoto and W.R. Jeffery. Univ. of Maryland, Col. Park.
- 26 B19 Using a comparative approach to study eye growth in the blind cavefish *Astyanax mexicanus*. A.G. Strickler and W.R. Jeffery. Univ. of Maryland, Col. Park.
- 27 B20 Hsp90 $\alpha$  regulates lens apoptosis during cavefish eye degeneration. T.A. Hooven, Y. Yamamoto and W.R. Jeffery. Univ. of Maryland.
- 28 B21 Evolution of Dlx genes and the teleost fish dentition. D.W. Stock and W.R. Jackman. Univ. of Colorado, Boulder.
- 29 B22 Oral Expression of Bmp2 and Bmp4 Orthologs in dentally divergent fishes. S.B. Wise and D.W. Stock. Univ. of Colorado, Boulder, CO.
- 30 B23 FGF signaling is required for zebrafish pharyngeal tooth development. W.R. Jackman and D.W. Stock. Univ. of Colorado, Boulder.
- 31 B24 FGF9 signaling in mouse gut development. X. Zhang, T.S. Stappenbeck, A.C. White, K.J. Lavine, J.I. Gorgon and D.M. Ornitz. Washington Univ. Med. Sch., St. Louis, MO.
- 32 B25 A fresh look at a developmental enamel defect in humans, mutant mice and fossil giraffes: a contribution to evo-devo. T. Franz-Odenaal. Univ. Cape Town, South Africa.

- 33 B26 Fundamental regulation of chordate heart development. B.J. Davidson and M. Levine. Univ. of California, Berkeley.
- 34 B27 Cardiomyocyte apoptosis as a cause of death in mice lacking cardiac muscle  $\alpha$ -actin. E. Abdelwahid, L.J. Pelliniemi, J.C. Szucsik, J.L. Lessard and E. Jokinen. Univ. of Turku, Finland, Children's Hosp. Med. Ctr., Univ. of Cincinnati, Cincinnati, OH, Univ. of Helsinki, Finland. H
- 35 B28 A comparative approach to the analysis of novel genes in vascular development. A. Mukhopadhyay, K. Siva, D. Das and M.S. Inamdar. Jawaharlal Nehru Ctr. for Advanced Scientific Res., Bangalore, India.
- 36 B29 Comparative limb morphogenesis in mice & bats. C.J. Cretekos, J.J. Rasweiler IV and R.R. Behringer. UT MD Anderson Cancer Ctr.
- 37 B30 Beetle wing development, a model system to analyze insect diversity. Y. Tomoyasu, S.R. Wheeler, T.D. Shippy and R.E. Denell.] Kansas State Univ., Manhattan KS and Washington Univ., St Louis MO, Kansas State Univ., Manhattan KS and Washington Univ., St Louis MO.
- 38 B31 Conserved and divergent functions of *Drosophila atonal*, amphibian and mammalian *Ath5* genes. N.L. Brown, S.L. Kanekar, M.L. Vetter, S. Gorski, Y-N. Jan, T. Glaser and Y. Sun. Children's Hosp. Res. Fndn., Univ. of Utah, Washington Univ. Sch. of Med., HHMI and Univ. of California, San Francisco, Univ. of Michigan Med. Sch. and Inst. of Molec. Pathol., Vienna, Austria.
- 39 B32 An evolutionarily conserved tyrosine-rich domain is required for Nkx2-5 function. M. Solloway, D. Elliott, O. Prall and R. Harvey. Victor Chang Cardiac Res. Inst., Darlinghurst, NSW Australia.
- 40 B33 Esx1-dosage effect and cellular function in the placenta. L.E. Fohn and R.R. Behringer. MD Anderson Cancer Ctr., Houston, TX.
- 41 B34 Role of lin-41 in developmental timing of vertebrates. B.R. Schulman and F.J. Slack. Yale Univ.
- 42 B35 How does the *C. elegans* lin-41 gene act to control the timing of development?. M. Carlson, K. Reinert, N. Saka, L. Petrella and F. Slack. Yale Univ.
- 43 B36 Generation of primate:mouse interspecific chimeras. G.S. Eakin, N. Nakatsuji and R.R. Behringer. Baylor Col. of Med., Kyoto Univ. and M.D. Anderson Cancer Ctr.
- 44 B37 Regulation of molting and reproduction by conserved nuclear receptor genes in *Caenorhabditis elegans*. C.R. Gissendanner, A. Sluder and C. Maina. New England Biolabs, Beverly, MA and Cambria Biosciences, Woburn, MA.
- 45 B38 The identification of the phylotypic stage in nematode embryos. W. Houthoofd, M. Willems, S. Vangestel, C. Mertens and G. Borgonie. Ghent Univ., Belgium.
- 46 B39 The embryonic development of the free-living nematode *Rhabditophanes* sp. M. Willems, W. Houthoofd, K. Jacobsen, S. Vangestel, C. Mertens, G. Borgonie. Ghent Univ., Belgium.
- 47 B40 Sterile caste in the polyembryonic wasp *Copidosoma floridanum*. T. Terzin, V. Zhurov and M. Grbic. Univ. of Western Ontario, London, Ontario Canada.
- 48 B41 The role of APETALA3 and PISTILLATA homologs in the production of novel floral morphologies. E.M. Kramer and M.A. Jaramillo. Harvard Univ.

- 49 B42 Sequences determining rna movement. T.T. Dinh, S. Gerttula, C. Ubach and N.R. Sinha. Univ. of California, Davis and Monsanto, St. Louis, MO.
- 50 B43 Functional dominance among hox genes: the genetic requirements. M.E. Williams and J.W. Innis. Univ. of Michigan, Ann Arbor.
- 51 B44 Evolution of the Hoxa2 gene: genomic and expression comparisons. J-L. Scemama, K. Augustino and E. Stellwag. East Carolina Univ., Greenville, NC.
- 52 B45 A global control region defines regulatory landscapes containing the HoxD complex and activates gene expression in developing digits. F. Spitz, F. Gonzalez and D. Duboule. Univ. of Geneva, Switzerland.
- 53 B46 The significance of precise temporal regulation of Hoxc8 expression at early embryonic stages in pattern formation. A.H. Juan and F.H. Ruddle. Yale Univ.
- 54 B47 Antp-class Hox and non-Hox sequences in a basal metazoan: the marine sponge *Haliclona loosanoffi*. A.L. Hill, J. Tetrault, M. Bartman and M.S. Hill. Fairfield Univ.
- 55 B48 Functional analysis of maternal Hro-nos, a nanos homolog in the leech *Helobdella robusta*. S.J. Agee and D.A. Weisblat. Univ. of California, Berkeley.
- 56 B49 Proper differentiation and function of the *Drosophila* insulin-producing cells is dependent on the Pax6 homolog *eyeless*. J.S. Clements, Y. Yuan Kang, R. Kollman, E.J. Rulifson and P. Callaerts. Univ. of Houston.
- 57 B50 Comment on brain developmental profile study. K.K. Leung, M.C. Fung and S.M. Ngai. Chinese Univ. of Hong Kong.
- 58 B51 The UNC-39/Six5 Homeodomain transcription factor affects anterior neuronal development in *C. elegans*. J. Yanowitz, A. Shakir, E. Hedgecock, A. Fire and E. Lundquist. Carnegie Inst. of Washington, Baltimore, Univ. of Kansas, Lawrence and Johns Hopkins Univ., Baltimore, MD.
- 59 B52 Ventral patterning of the CNS in flies and fish: the role of Nkx6 proteins. S.E. Cheesman, T. Von Ohlen, C.Q. Doe and J.S. Eisen. Univ. of Oregon and Kansas State Univ.
- 60 B53 Differences in midline kinetics of forebrain commissural axons in vivo. M. Bak and S.E. Fraser. California Inst. of Technology.
- 61 B54 A new model for brain formation in *Xenopus*. A role for BMP antagonists in the blastula Pre-organizer. H. Kuroda and E.M. De Robertis. Howard Hughes Med. Inst., UCLA.
- 62 B55 Changes in activities of developmental genes and genetic networks underlying reproductive flexibility in the Cnidarian *Nematostella*. P. Burton, J. Ryan, K. Pang, M. Eggen, S. Schaus, M. Martindale and J. Finnerty. Boston Univ. and Univ. of Hawaii.
- 63 B56 Instability of the murine sex determining *Sry* locus is a likely by-product of secondary structure formation. F.S. Nallaseth and M.L. Tracey. FAU, Boca Raton & FIU, Miami and Mt. Sinai Sch. of Med., New York, NY.
- 64 B57 The role of BMP4 in early prostate development. G. Almahbobi, S. Hedwards, G. Fricout, D. Jeulin, L.A. Cullen-McEwen, J.F. Bertram and G.P. Risbridger. Monash Univ., Melbourne, Australia and Ecole des Mines de Paris, France. M

- 65 B58 Understanding the cambrian explosion by estimating ontogenetic depth. P.A. Nelson and M.R. Ross. Discovery Inst. and the Univ. of Rhode Island.

### Intracellular Signaling Pathways

- 66 B59 Computer modeling of phosphoinositide signaling: combining structure, electrostatics and bioinformatics to understand how the binding of proteins to membrane surfaces is regulated. D. Murray. Weill Med. Col. of Cornell Univ.
- 67 B60 Genetic Interactions of the *Dictyostelium discoideum* E3 ubiquitin ligase component FbxA with cAMP metabolism and a histidine kinase signaling pathway. D.I. Ratner, T. Tekinay, H.L. Ennis, M.Y. Wu, M.K. Nelson and R.H. Kessin. Columbia Univ., New York and Amherst Col., Amherst, MA.
- 68 B61 *sightless* encodes a transmembrane acyltransferase required for Hedgehog signaling. G.I. Miura, J.D. Lee and J.E. Treisman. New York Univ. Sch. of Med.
- 69 B62 Smoothed translates different levels of hedgehog into distinct responses. J. Hooper. Univ. of Colorado Hlth. Sci. Ctr., Denver.
- 70 B63 Subcellular localization of rab23, a negative regulator of the hedgehog signaling pathway. T.M. Evans, B.J. Wainwright, R.G. Parton and C.A. Wicking. Univ. of Queensland, Australia.
- 71 B64 Genetic dissection of Notch functions in rostro-caudal patterning of somites. Y. Takahashi, T. Inoue, A. Gossler and Y. Saga. Natl. Inst. of Hlth. Sci., Kamiyoga, Setagayaku, Tokyo, Japan; Institut für Molekularbiologie, MHH, Hannover, Natl. Inst. of Genet., Yata, Mishima, Japan.
- 72 B65 Two transgenic zebrafish be involved with Notch signaling; hsp-Mib:EGFP and pher4:EGFP. S-Y. Yeo and A. Chitnis. NIH, NICHD, Bethesda, MD.
- 73 B66 Canoe: linking signaling pathways. A. Carmena and M. Baylies. Sloan-Kettering Inst. New York, NY.
- 74 B67 Regulation of Src64 activity during *Drosophila* Oogenesis. A. Ballew, A. O'Reilly, H. Stocker, E. Hafen and M. Simon. Univ. of Zurich and Stanford Univ.
- 75 B68 Mutational analysis of LRP6 in Wnt signal transduction. K. Tamai, X. Zeng and X. He. Children's Hosp., Harvard Med. Sch.
- 76 B69 Identification of Wnt target genes in the neural crest. L. Taneyhill Ziemer and M. Bronner-Fraser. California Inst. of Technology.
- 77 B70 Regulation of cell and tissue polarity by Daam and Wnt signaling. M. Nakaya, R. Habas, X. He and T.P. Yamaguchi. NCI-FREDERICK, Frederick, MD and Harvard Med. Sch., Boston, MA.
- 78 B71 Dishevelled-1 and Smad protein interactions in embryonic orofacial tissue. D.R. Warner, R.M. Greene, E.A. Roberts and M. Michele Pisano. Univ. of Louisville Birth Defects Ctr. and Univ. of Louisville Sch. of Dentistry.
- 79 B72 Evidence for a GPI-anchored co-receptor in bone morphogenetic protein signaling. J.A. Sánchez-Duran, E. Kanakubo, L. Pham, A. Kumbasar, M. Stigson and A.D. Lander. Univ. of California, Irvine.
- 80 B73 Par-1 and Par-4 (XEEK1, LKB1) function in *Xenopus* embryos. O.N. Ossipova and J.B.A. Green. Dana Farber Cancer Inst./Harvard Med. Sch., Boston, MA.

- 81 B74 Inhibition of PDGF signaling results in apoptosis of mesoderm cells during gastrulation in *Xenopus laevis*. M. Van Stry, K. McLaughlin and K. Symes. Boston Univ. Sch. of Med. and Tufts Univ.
- 82 B75 IGF-I receptor signaling in zebrafish development. J. Wang, J. Chan and T. Roberts. Dana-Farber Cancer Inst., Harvard Med. Sch., Boston, MA.
- 83 B76 Dissecting the role of vascular endothelial growth factor during arterial development and differentiation. N. Lawson, L. Covassin, B. Diamond, J. Mugford and B. Weinstein. Univ. of Massachusetts Med. Sch., Worcester, and NIH, NICHD, Bethesda, MD.
- 84 B77 An allelic series of mutants in phospholipase C-gamma-1 reveals its requirement for arterial development in zebrafish. L. Covassin, M. Bakis, B. Weinstein and N. Lawson. NICHD, NIH.
- 85 B78 Differential signaling by ErbB family ligands in fetal mouse submandibular glands. M. Kashimata, N. Koyama and E.W. Gresik. Asahi Univ. Sch. of Dent., Gifu, Japan and CUNY Med. Sch., New York.
- 86 B79 Dusp6 is a negative regulator of FGF signaling in mice. C. Li and S.L. Mansour. Univ. of Utah, Salt Lake City.
- 87 B80 MEK signaling regulates cartilage-specific gene expression in embryonic limb mesenchyme. B.E. Bobick and W.M. Kulyk. Univ. of Saskatchewan, Saskatoon, Canada.
- 88 B81 RAW restricts DJNK signaling during dorsal closure in *Drosophila*. K.L. Bates and A. Letsou. Univ. of Utah.
- 89 B82 Neuroglial/central brain deranged signals through small GTPases during axon growth, guidance and branching in the developing mushroom bodies. P. Callaerts, N. Sidhu, P.R. Hiesinger, R. Islam, M. Hortsch and Y.Y. Kang. Univ. of Houston, HHMI, Baylor Col. Med. and Univ. of Michigan.
- 90 B83 DIM-7/MSK encodes the nuclear transporter for activated D-ERK. J.A. Lorenzen, S. Krishnamoorthy and L.A. Perkins. Massachusetts Gen. Hosp./Harvard Med. Sch.

## Gene Regulation

- 91 B84 A Proteomic approach to identify developmentally important transcriptional regulators. W.V. Gerber, F. Schoek and H. Jaeckle. Max Planck Inst. for Biophys. Chemistry.
- 92 B85 Transgenic and comparative genomic analysis revealed novel long-range regulation of *nkx2-5* in mouse development. X. Chi, F.J. DeMayo and R.J. Schwartz. Ctr. for Cardiovasc. Develop., Baylor Coll. of Med.
- 93 B86 A search for targets of the *Drosophila* neuroblast temporal network. T. Brody, C. Stivers, D. Russ, C. Stevenson and W.F. Odenwald. NINDS, NIH, CIT, NIH, Bethesda, MD.
- 94 B87 A system for conditional RNA interference in the mouse using the lac operator-repressor system. T. Sasaki and H. Scrabble. Univ. of Virginia, Charlottesville.
- 95 B88 Differing susceptibilities to systemic RNAi within the *Caenorhabditis* clade. V. Descotte and M.K. Montgomery. Macalester Col., St. Paul, MN.
- 96 B89 Molecular characterization of the chicken *Msx2* AER-specific enhancer. H-C. Cheng, C-K.L. Wang and W. Upholt. Sch. of Dent. Med., Univ. of Connecticut Hlth. Ctr., Farmington and Inst. of Molec. Biol., Academia Sinica, Taiwan.

- 97** B90 Regulation of the chicken *Msx2* gene by BMP. J. Chen, H-C. Cheng, M.A. Gionfriddo and W.B. Upholt. Sch. of Dent. Med., Univ. of Connecticut Hlth. Ctr., Farmington, CT.
- 98** B91 Upstream of SoxB genes: identifying and linking signal components required for neural induction and differentiation in *Xenopus laevis*. E. Silva Casey, D. Strong and R. Harland. Georgetown Univ., Washington, DC Univ. of California, Berkeley.
- 99** B92 *Dlx* regulation in the developing forebrain: interactions between *cis*-acting regulatory elements in transgenic mice and zebrafish. O. Jarinova, Q. Long and M. Ekker. Univ. of Ottawa, Canada and Vanderbilt Univ. Med. Ctr., Nashville.
- 100** B93 Differential *Dlx* gene regulation mechanisms in the ventral forebrain of vertebrates through the action of different enhancers in *Dlx* paralogs. N. Ghanem, G. Hatch, O. Jarinova and M. Ekker. Ottawa Hlth. Res. Inst. and Univ. of Ottawa, Ottawa, Ontario.
- 101** B94 Cortical interneuron migration from the basal forebrain is mediated by direct regulation of the neuropilin-2 receptor by *dlx* homeobox genes. T.N. Le and D.D. Eisenstat. Univ. of Manitoba, Winnipeg, Canada.
- 102** B95 Transgenic analysis of genomic regulation of the *Dll-B* gene in the ascidian *Ciona intestinalis*. S.Q. Irvine and F.H. Ruddle. Yale Univ.
- 103** B96 Molecular characterization of the bHLH protein mist1. T. Tran, J. Michael Rukstalis and S.F. Konieczny. Purdue Univ., W. Lafayette, IN.
- 104** B97 Identification of transcriptional targets for proneural bHLH factors. M.A. Logan, E. Callahan, M. Steele and M.L. Vetter. Univ. of Utah, Salt Lake City.
- 105** B98 Differential regulation of gene expression and differentiation by homo- and heterodimers of the bHLH protein twist. Y. Leshem, V. Andreeva, C. Muentener, M. Connerney and D. Spicer. Maine Med. Ctr. Res. Inst., Scarborough, ME.
- 106** B99 Regulators of E(spl) expression in imaginal discs during *Drosophila melanogaster* larval development. D. Eastman and K. Eby. Connecticut Col., Southwestern Univ.
- 107** B100 A BAC-GFP construct revealed the faithful recapitulation of endogenous zebrafish *myf5* expression. Y. Chen, Y. Wang, M. Westerfield and H. Tsai. Natl. Taiwan Univ., Taipei, Taiwan and Univ. of Oregon, Eugene, OR.
- 108** B101 An intron segment represses the somite-specific expression of zebrafish (*Danio rerio*) *myf-5* gene. C. Lin, Y. Chen, H. Lee and H. Tsai. Natl. Taiwan Univ., Taipei, Taiwan.
- 109** B102 Cloning and characterization of the 5-flanking region for the *Ehox* gene. W.K. Lee, Y-M. Kim, N. Malik, C. Ma and H. Westphal. LMGD, NICHD, NIH.
- 110** B103 Regulation of Hox gene *lin-39* during *C. elegans* vulval development. J. Wagmaister and D. Eisenmann. UMBC.
- 111** B104 Prep1 is essential in embryo development and its inactivation results in homeotic defects and embryonic lethality in both zebrafish and mouse. F. Blasi, F. Argenton, E. Ferretti, G. De Florian, L. Fernandez and M. Bortolussi. Univ. Vita Salute San Raffaele, Univ. of Padova, Italy.



- 112** B105 A GATA4 hypomorphic allele reveals a critical relationship between GATA4 expression levels and cardiac morphogenesis and function. W.T. Pu, Q. Ma and S. Izumo. Boston Children's Hosp., Beth Israel Deaconess Med. Center.
- 113** B106 Functional analysis of X-msr in the developing vascular and nervous system. K.K. Gleason, T. Curtis, A. Lim, D. De Simone and M.S. Saha. Col. of William and Mary.
- 114** B107 Identification of the GATA-2 neuronal element binding protein repressor as Pur alpha. W.T. Penberthy, J.R. Jessen, A. Meng and S. Lin. Univ. of California Los Angeles.
- 115** B108 Brn-3a is sufficient to rescue retinal ganglion cells loss in Brn-3b null mice. L. Pan, Z. Yang and L. Gan. Univ. of Rochester Med. Center.
- 116** B109 Expression of rat Alx3 in the developing central nervous system and pancreatic islets of Langerhans. M. Mirasierra and M. Vallejo. Instituto de Invest. Biomédicas Alberto Sols, Spanish Council for Sci. Res. (CSIC)/Autonoma Univ., Madrid.
- 117** B110 Regulation of Prospero expression in longitudinal glial cells. Y. Yuasa and Y. Hiromi. Natl. Inst. Genet., Japan.
- 118** B111 TEF-1 dependent activation of  $\alpha$  tropomyosin gene in the smooth muscle mcell lineage. P. Thiébaud, S. Pasquet, W. Barillot, M. Olive, C. Fauchoux and N. Thézé. Unité INSERM, Av. du Haut Livjue, France.
- 119** B112 A pharyngeal muscle specific enhancer from *ceh-22* is targeted by PHA-4 and other factors. T. Vilimas, A. Abraham and P.G. Okkema. Univ. of Illinois at Chicago.
- 120** B113 Identification of N-myc regulatory domains required for visceral arches, somites and limb buds expression. J. Charron, B. Lachapelle, M. Tremblay and J-F. Cadrin-Girard. Univ. Laval and L'Hotel-Dieu de Québec, CHUQ, QC, Canada.
- 121** B114 Identification and characterisation of Indian hedgehog target genes in limb development. M. Wuelling, A. Ratzka, M. Wenzel, S. Schneider and A. Vortkamp. Max-Planck Inst. for Molec. Genet., Berlin, Germany.
- 122** B115 PAPS synthetase gene expression relates directly to the murine Brachymorphism (Bm) phenotype. M. Cortes, B.K. Kurima and N.B. Schwartz. Univ. of Chicago.
- 123** B116 Somatostatin and somatostatin receptor expression are altered in transgenic Isl-1 mice. H. Dinh, D. Costanzo, J.M. Salbaum and C. Kappen. Univ. of Nebraska Med. Ctr., Omaha.
- 124** B117 PITX2 isoform specific regulation of ANF expression: synergism and repression with Nkx2.5. M. Ganga, H.M. Espinoza, Y. Lee, T.A. Hjalt and B.A. Amendt. Univ. of Tulsa, OK, Univ. of Wisconsin-Madison, and Lund Univ., Sweden.
- 125** B118 Cloning and functional characterization of HIF-1 $\alpha$  upstream regulatory regions in *Xenopus laevis*. C.W. Sipe, E.J. Gruber and M.S. Saha. MCol. of William and Mary.
- 126** B119 A transgenic analysis of the regulation of *Xcad3*, a *caudal*-related gene from *Xenopus laevis*. J.S. Reece-Hoyes, M.E. Pownall and H.V. Isaacs. Univ. of York, England.
- 127** B120 Function of the novel C. elegans factor PEB-1 requires nuclear localization and DNA binding activity. L. Beaster-Jones and P. Okkema. Univ. of Illinois-Chicago.

- 128** B121 Transcriptional response to hypoxia in *Drosophila* is controlled by fatiga, a prolyl-4-hydroxylase that functions as an oxygen sensor. L. Centannin, J. Mondotte and P. Wappner. Leloir Fndn., Patricias Argentinas, Buenos Aires, Argentina.
- 129** B122 Developmental expression of *Drosophila* RNP-4F, a fly homolog of the human P110/Sart 3 U4/U6 snRNP recycling factor. J.P. Petschek and V.J. Concel. Case Western Reserve Univ.
- 130** B123 Promoter analyses of shortroot and scarecrow. N. Matsumoto, J. Colinas and P. Benfey. Duke Univ.
- 131** B124 Transcriptional regulation in oocyte-specific genes. J.L. Song and G.M. Wessel. Brown Univ., Providence, RI.
- 132** B125 MIZF, an MBD2-interacting zinc finger protein, is a sequence- specific transcriptional repressor. M. Sekimata and Y. Homma. Fukushima Med. Univ.

## Cell Proliferation

- 133** B126 Regulation of neural crest apoptosis in *Xenopus laevis* by XSlug and BMP4/Xmsx-1. C. Tribulo, M.J. Aybar, S.S. Sánchez and R. Mayor. HHMI and MNDB, Fac. of Sci., INSIBIO (Univ. of Tucuman-CONICET), Argentina.
- 134** B127 The role of XChk2 protein kinase in the early embryonic development of *Xenopus laevis*. B.N. Wroble and J.C. Sible. Virginia Polytechnic Inst. and State Univ.
- 135** B128 A quantitative analysis of the dna replication checkpoint in *Xenopus laevis*. I. Auckland, A. Dravid, W. Sha, J.J. Tyson and J.C. Sible. Virginia Polytechnic Inst. and State Univ.
- 136** B129 XCTK1: a *Xenopus* C-terminal kinesin-like protein. S. Winfree and S. Reinsch. NASA-Ames Res. Ctr., Lockheed Martin Inc., Moffett Field, CA.
- 137** B130 Sonic hedgehog regulates the maintenance of neural progenitors in the ventral spinal cord. S. Oh and C. Chiang. Vanderbilt Univ. Med. Center.
- 138** B131 FGFR1 is essential for hippocampal development by regulation of radial glia proliferation. Y. Ohkubo, A.O. Uchida, D. Shin, J. Partanen and F.M. Vaccarino. Yale Univ., New Haven, CT and Univ. of Helsinki, Finland.
- 139** B132 Telencephalon-specific rb knockouts reveal aberrant cortical development. K.L. Ferguson, J.L. Vanderluit, V. Nikolettou, W.C. McIntosh and R.S. Slack. Ottawa Hlth. Res. Inst., Univ. of Ottawa.
- 140** B133 The role of e2f1 in regulating neural stem cells in the mouse brain. V. Nikolettou, K.L. Ferguson, W.C. McIntosh, J.G. MacLaurin and R.S. Slack. Ottawa Hlth. Res. Inst., Univ. of Ottawa.
- 141** B134 Role of Gdf11 in retinal neurogenesis. J. Kim, H-H. Wu, S. Ivkovic, K. Lyons and A. Calof. Univ. of California, Irvine and Univ. of California, Los Angeles.
- 142** B135 Functional interactions of the product of the proto-oncogene tcl1 during early preimplantation embryo development in the mouse. M.T. Fiorenza, S. Torcia, G. Ragona, M.G. Narducci, A. Bevilacqua, G. Russo and F. Mangia. Univ. La Sapienza of Rome and Istituto Dermopatico della Immacolata, Rome, Italy.
- 143** B136 Regulation of teratocarcinoma stem cells by the murine blastocyst: a molecular approach. J.P. Gaillard, A. Diez, P. Vecino and J. Arechaga. Univ. of the Basque Country, Lejona, Spain.

- 144** B137 Isolation and characterization of zebrafish *cdc25* genes. D. Dalle Nogare, M. Barrutia, N. Ngo and M.E. Lane. Rice Univ.
- 145** B138 Membrane trafficking and cytokinesis. J.T. Blankenship, R. Farkas, C. Robinett and M. Fuller. Stanford Univ.

### Germ Cells and Gametogenesis

- 146** B139 Primordial germ cell development in the insect, *Rhodnius prolixus*. R.D. Graham and E. Huebner. Univ. of Manitoba.
- 147** B140 Primordial germ cell development in the Japanese newt *Cynops pyrrhogaster*. Y. Tamori and M. Wakahara. Grad. Sch. of Sci., Hokkaido Univ., Sapporo, Japan.
- 148** B141 Investigating the molecular basis of germ cell specification in planarians. R.M. Zayas and P.A. Newmark. Univ. of Illinois at Urbana-Champaign.
- 149** B142 Sexualization by a putative sexualizing substance in the planarian *Dugesia ryukyuensis*. K. Kobayashi, S. Arioka, M. Matsumoto and M. Hoshi. Keio Univ., Japan.
- 150** B143 Reproductive mode, ploidy and emergence of eye-less worms in the F1 offspring by random inbreeding of *acquired sexuals* in the planarian *Dugesia ryukyuensis*. S. Arioka, K. Kobayashi, M. Matsumoto and M. Hoshi. Keio Univ., Japan.
- 151** B144 Selective transport and packaging of the major yolk protein in the sea urchin. J.M. Brooks and G.M. Wessel. Brown Univ., Providence, RI.
- 152** B145 Requirement of localized maternal factors for zebrafish germ cell formation. Y. Hashimoto, S. Maegawa, K. Yasuda and K. Inoue. Grad. Sch. of Biol. Sci., Nara Inst. of Sci. and Technol., Japan.
- 153** B146 A binding site for germ cell nuclear factor within c-mos regulatory sequences. A.V. Zilz and G.M. Cooper. Boston Univ.
- 154** B147 Fibroblast growth factor 9 promotes male specific germ cell survival in the developing gonad. L. DiNapoli, J. Schmahl and B. Capel. Duke Univ. Med. Ctr.
- 155** B148 Effect of *phgpx* overexpression on spermatogenesis in transgenic mice. R. Puglisi, A. Bevilacqua, G. Carlomagno, F. Mangia and C. Boitani. Univ. "La Sapienza", Rome, Italy.
- 156** B149 Expression of GDNF/GFR $\alpha$ -1 during the mouse spermatogenesis and the effects of GDNF for spermatogonia cell development. Y. Nishina, H. Kikuchi, S. Goto and T. Saitoh. Yokohama City Univ.
- 157** B150 A Ca<sup>2+</sup>-sensitive actin-binding and -bundling protein associated with Sertoli cell ectoplasmic specializations. I. Tanii, H. Iida, K. Yoshinaga. Miyazaki Med. Col., Kyushu Univ., Japan.
- 158** B151 SCP/TAPS gene expression in *Drosophila*. G.E. Kovalick and D.L. Griffin. Univ. of Texas of the Permian Basin, Odessa, TX.
- 159** B152 SLBP accumulation during meiotic maturation is required for normal histone synthesis in the mammalian egg. P. Allard, W. Marzluff and H. Clarke. McGill Univ. and Univ. of North Carolina.
- 160** B153 Structure-function analysis of Vg1RNA binding protein. K. Rand, F. Oberman and J.K. Yisraeli. Hebrew Univ. Med. Sch., Jerusalem, Israel.

- 161** B154 Roles of MPF and MAP kinase in morphological changes that occur during oocyte maturation. T. Kotani and M. Yamashita. Grad. Sch. of Sci., Hokkaido Univ.
- 162** B155 The role of *zero population growth* in oogenesis. M.Y. Davis, L. Gilboa and R. Lehmann. Skirball Inst., NYU.
- 163** B156 The f-box protein *slimb* is required for egg chamber development in *drosophila melanogaster*. M. Muzzopappa and P. Wappner. Fundacion Instituto Leloir, Patricias Argentinas, Buenos Aires.
- 164** B157 The role of *sqd* in anterior-Pior patterning during *Drosophila melanogaster* oogenesis. D. Finch, R. Ruffle, L. Gibson, M. Hamas and A. Norvell. The Col. of New Jersey.
- 165** B158 A Role for the RNA-binding protein LARK in oogenesis. R. Galioto, F. Smith and G.P. McNeil. York Col., CUNY.
- 166** B159 Presence of cadherin during oogenesis in the brown spider *Loxosceles intermedia*. A.C. Santiago-Filha, R. Morishita and C.D. Faraco. Dep. Cell Biology. Uni. Fed. Paraná. Brazil.

## Fertilization

- 167** B160 Calcium release at sea urchin fertilization depends on signaling mediated by the  $\beta\gamma$  subunits of heterotrimeric G-proteins. E. Voronina and G.M. Wessel. Brown Univ.
- 168** B161 Analysis of egg plasma membrane proteins at fertilization. S.A. Haley and G.M. Wessel. Brown Univ.

## Early Embryo Patterning

- 169** B162 Electric embryos: endogenous ion fluxes and voltage gradients in left-right asymmetry. M. Levin. The Forsyth Inst./Harvard Univ.
- 170** B163 Elements of left-right patterning: gap junctions, pH, and membrane voltage. D. Adams and M. Levin. The Forsyth Inst.
- 171** B164 Difference in the maternal and zygotic contributions of tumorhead on embryogenesis. C.F. Wu, A.P-Y. Chan and L.D. Etkin. Univ. of Texas M. D. Anderson Cancer Ctr., Houston.
- 172** B165 The RNA binding protein Vg1 RBP is required for cell migrations during early neural development. K. Yaniv, A. Fainsod, C. Kalcheim and J.K. Yisraeli. Hebrew Univ.-Hadassah Med. Sch., Jerusalem, Israel.
- 173** B166 Regulation of Xnr2 in the vegetal marginal zone. C.H. Ezal and W.C. Smith. Univ. of California at Santa Barbara.
- 174** B167 Searching for VegT target genes and exploring their functions. N.V. Taverner and J.C. Smith. Univ. of Cambridge, UK.
- 175** B168 Ethanol exposure affects Spemann's organizer through retinoic acid signaling. R. Yelin, A. Frumkin, H. Kot, G. Pillemer and A. Fainsod. Fac. of Med., Hebrew Univ., Jerusalem and Hebrew Univ.-Hadassah Med. Ctr., Jerusalem, Israel.
- 176** B169 The secreted Frizzled-related protein Sizzled functions as a negative feedback regulator of extreme ventral mesoderm. L. Collavin and M.W. Kirschner. Harvard Med. Sch. and Trieste Univ., Italy.

- 177** B170 BMP-3b and BMP-3 function as different dorsalizing factors in *Xenopus* embryos. S. Nishimatsu, J. Hino, T. Nagai, T. Nohno, H. Matsuo and K. MaKangawa. Kawasaki Med. Sch., Okayama, Japan, Natl. Cardiovasc. Ctr. Res. rdInst., Osaka, Japan and RIKEN Brain Sci. Inst., Saitama, Japan. pa
- 178** B171 Xnr3 regulates convergent extension movement via the FGF receptor. C. Yokota, M. Kofron, M. Zuck, D.W. Houston, H. Isaacs, M. Asashima, C.C. Wylie and J. Heasman. Cincinnati Children's Hosp. Res. Fdn., Cincinnati, OH, Univ. of York, York, UK and Univ. of Tokyo, Tokyo, Japan.
- 179** B172 Role of *Xenopus* Rap2B, a new player of Wnt/  $\beta$ -catenin signaling athway pin dorsalization of embryonic axis. S. Choi and J. Han. POSTECH, South SKorea.
- 180** B173 Twisted gastrulation directly alters BMP inhibition by Chordin. B. Reversade, M. Oelgelschl ger and E.M. De Robertis. Howard Hughes Med. Inst., UCLA.
- 181** B174 RhoA-mediated planar cell polarity (PCP) pathway is conserved in both invertebrates and vertebrates. G-H. Kim and J-K. Han. POSTECH, Pohang, Republic of Korea.
- 182** B175 *Xenpous* LIM-homeodomain protein Xlim5 regulates cell adhesion in early ectoderm development. D.W. Houston and C. Wylie. Cincinnati Children's Hosp. Med. Ctr.
- 183** B176 Grainyhead, a newly identified mediator of BMP4 signaling during vertebrate ectodermal specification. J. Tao, S.M. Jane, P.E. Mead and J.M. Cunningham. St. Jude Children's Res. Hosp., Memphis and Rotary Bone Marrow Lab., Melbourne, Australia.
- 184** B177 The novel gene *Ashwin* functions in *Xenopus* neural development. T.B. Alexander and A.K. Sater. Univ. of Houston, Houston, TX.
- 185** B178 The cement gland as a paradigm for anterior ectodermal position. S. Li and H. Sive. Whitehead Inst. for BioMed. Res. and Massachusetts Inst. of Technol., Cambridge.
- 186** B179 Arx expresses during forebrian patterning in early *Xenopus* development. M. Wolanski, F. KhosrowShahian, M. Downorowicz and M.J. Crawford. Univ. of Windsor.
- 187** B180 The regulatory mechanism of Pior neural specific gene FoxB1. D.H. Cai and H. Sive. Whitehead Inst.
- 188** B181 Induction and function of xenopus six1 in cranial placodes. S.A. Brugmann, P.D. Pandur and S.A. Moody. George Washington Univ., Washington, D.C.
- 189** B182 *Xenopus* Pitx3 plays a role during eye development. F. KhosrowShahian, M. Wolanski, K. Fujiki and M.J. Crawford. Univ. of Windsor.
- 190** B183 Protein kinase ck2 promotes wnt signaling in *Xenopus* embryos. I. Dominguez, J. Mizuno, D.H. Song, K. Symes and D.C. Seldin. Boston Univ. Sch. of Med., Boston MA.
- 191** B184 The role of Xenopus Idax gene in non-canonical Wnt signaling pathway. T. Michiue, K. Sakurai, H. Kobayashi, A. Yukita, A. Fukui, A. Kikuchi and M. Asashima. Univ. of Tokyo and Hiroshima Univ.
- 192** B185 Investigating TGF- $\beta$  proteins during the induction and patterning of mmesoderm in *Xenopus laevis*. P. Huw Williams and J.C. Smith. TWellcome Trust/Cancer Res. UK Inst., Univ. of Cambridge, UK.
- 193** B186 Inhibition of mesodermal fate by *Xenopus* HNF3 $\beta$ /FoxA2. T. Haremaki, C. Suri and D.C. Weinstein. Mt. Sinai Sch. of Med., New York.

- 194** B187 Dkk1 induces heart by stimulating a diffusible intermediary factor. A. Foley and M. Mercola. The Burnham Inst. and UCSD Sch. of Med.
- 195** B188 Endogenous cerberus activity is required for anterior head specification in *Xenopus*. A.C. Silva, M. Filipe, K-M. Kuerner, H. Steinbeisser and J.A. Belo. Instituto Gulbenkian de Ciencia R. da Quinta Grande, Apartado, Oeiras Portugal F.E.R.N. Univ. do Algarve Campus de Gambelas, Faro Portugal Inst. for Human Genet. Univ. of Heidelberg Im Neuenheimer Feld Germany.
- 196** B189 Inhibition of multiple primitive streak formation. F. Bertocchini and C. Stern. UCL, London.
- 197** B190 Inhibition of differentiation by chondroitin sulfate in the early chick embryo. S. Sidhu, E. Richard and D.R. Canning. Murray State Univ.
- 198** B191 A fate MAP of the endoderm of the early chick embryo. W. Kimura, S. Yasugi and K. Fukuda. Tokyo Metropolitan Univ.
- 199** B192 Hypoblast and anterior definitive endoderm pattern anterior identity in early chick. S. Chapman, F. Schubert, G. Schoenwolf and A. Lumsden. MRC Ctr. for Develop. Neurobiol., Kings Col. London, UK and Neurobiol. and Anat., Univ. of Utah.
- 200** B193 Serotonin is a novel very early signaling mechanism in Left-Right asymmetry. T. Fukumoto and M. Levin. The Forsyth Inst.
- 201** B194 Characterization of the role of a chick Claudin family member in patterning the left-right axis. A. Simard and A.K. Ryan. Montreal Children's Hosp. Res. Inst., McGill Univ., Montreal, Canada.
- 202** B195 Antagonism of the SHH pathway by the Opitz syndrome gene MID1: patterning the left-right axis and ventral midline. A. Granata, D. Savery and N.A. Quaderi. Kings Col. London.
- 203** B196 Tsukushi, a novel BMP inhibitor, is involved in the organizer formation. K. Ohta, G. Lupo, S. Ohnuma, S. Kuriyama, R. Keynes, C.E. Holt, W.A. Harris and H. Tanaka. Kumamoto Univ., Japan, Univ. of Cambridge, UK, and PRESTO, JST, Kawaguchi, Japan.
- 204** B197 Early specification of neural crest in gastrulating chicken embryos. M.L. Basch, M. Bronner-Fraser and M.I. Garcia-Castro. California Inst. of Technology.
- 205** B198 Neural tube signals are involved in otic vesicle regionalisation in chick. F. Aragón, E. Ulloa, S. Cereghini, B. Alsina, F. Giraldez and C. Pujades. Develop. Biol. Gp., UPF, Barcelona, Spain, CNRS UMR Paris, France.
- 206** B199 Targeted non-viral gene delivery for studying neurogenesis in the chick embryo. M.J. de Castro and G.C. Schoenwolf. Univ. of Utah, Salt Lake City.
- 207** B200 Inter-rhombomeric signaling and the role of r4 in maintaining EphA-4 expression in r5. F. Cambroner, L. McNaughton and R. Krumlauf. Stowers Inst. for Med. Research.
- 208** B201 Regulating Fgf8 expression at the isthmus. C.A. Canning, C. Irving and I. Mason. Kings College London, Univ. Col. London.
- 209** B202 A role for BMPs in the formation of the ventral hypothalamus. L. Manning, K. Ohyama, S. Soubes and M. Placzek. Univ. of Sheffield, UK.
- 210** B203 Anterior-posterior limb position is dependent on the relative timing of key embryonic events. T.C. Prestwich, T.D. Stephens and M.R. Stark. Brigham Young Univ. and Idaho State Univ.

- 211** B204 The mouse gene expression database (GXD): a resource for developmental biologists. C.M. Smith, D.A. Begley, J.T. Eppig, J.H. Finger, T.F. Hayamizu, D.P. Hill, J.A. Kadin, I.J. McCright, J.E. Richardson and M. Ringwald. Mouse Genome Informatics, Bar Harbor, ME.
- 212** B205 Early mouse blastomeres have distinguishable fates. K. Piotrowska and M. Zernicka-Goetz. Wellcome Trust/ Cancer Res. UK Inst., Univ. of Cambridge, UK.
- 213** B206 Cdx2 and eomesodermin are essential for the establishment of the trophoblast lineage in the mouse embryo. D. Strumpf, C. Mao and J. Rossant. Samuel Lunenfeld Res. Inst., Mt. Sinai Hosp., Toronto, Ontario, Canada.
- 214** B207 Cell movements in the pre-streak stage mouse embryo epiblast. E.M. Morin-Kensicki, J.A. Rivera-Perez and T.R. Magnuson. Univ. of North Carolina at Chapel Hill.
- 215** B208 Relationship of blastocyst axis to first cleavage plane in mouse development. V.B. Alarcsn and Y. Marikawa. Univ. of Hawaii.
- 216** B209 The *Nodal/Smad2* pathway patterns anterior streak derivatives in the developing mouse embryo. S. Vincent and E.J. Robertson. Harvard Univ., Cambridge.
- 217** B210 Identification of genes involved in left-right axis formation. F. Olale, R. Burdine, S. Zimmerman, S. Geiger-Rudolph, R. Geisler, T. Obara, I. Drummond and A. Schier. Skirball Inst. of Biomolec. Med., NYU Sch. of Med., Max-Planck- Inst., Tuebingen, Germany, Massachusetts Gen. Hosp. and Harvard Med. Sch.
- 218** B211 *Zic3* is critical for early embryonic patterning and the maintenance of symmetry during gastrulation. S.M. Ware, K.G. Harutyunyan and J.W. Belmont. Baylor Col. of Med., Houston, TX.
- 219** B212 Screening for genes involved in the establishment of the AP axis in the mouse. M-E. Torres-Padilla, S. Frankenberg, R.A. Pedersen and M. Zernicka-Goetz. Univ. of Cambridge, UK.
- 220** B213 A novel mouse mutant, mermaid, exhibits defects in paraxial mesoderm development. F. Lupu, K. Anderson and E. Lacy. Sloan Kettering Inst.
- 221** B214 Microarray analysis of proximo-distal differential expression in post-implantation mouse embryos. S. Frakenberg, L. Smith, A. Greenfield and M. Zernicka-Goetz. The Wellcome Trust/Cancer Res. UK Inst. of Cancer and Develop. Biology.
- 222** B215 Mesoderm induction by the bmp, FGF, and nodal pathways. D.H. Lee, D. Green, W.S. Talbot and A.F. Schier. Skirball Inst. of Biomolec. Med., NYU Sch. of Med. and Stanford Sch. of Med., Stanford, CA.
- 223** B216 Characterizing the cranial mesoderm in early mouse development. K. Melton, K. Zueckert-Gaudenz and P.A. Trainor. Stowers Inst. and Children's Mercy Hosp., Kansas City, MO.
- 224** B217 Establishing endoderm organ domains in mouse and chick involves a Pior FGF signal. J. Kordich, R. Opoka and J.M. Wells. Cincinnati Children's Hosp. Res. Foundation.
- 225** B218 Lineage specification and cell movement of extraembryonic endoderm in the early mouse embryo. Y. Yamanaka, C. Chazaud and J. Rossant. Mt. Sinai Hosp., Toronto, Ontario, Canada.
- 226** B219 *Smad2* and *Smad3* coordinately regulate craniofacial and endodermal development. Y. Liu, J.C. Thompson and M. Weinstein. Ohio Sate Univ., Columbus.

- 227 B220 Separate signals from the neural plate and the mesoderm cooperate to induce the pre-placodal domain. A. Litsiou, A.P. Bailey and A. Streit. King's Col. London, London, UK.
- 228 B221 Yes-associated protein is required for proper embryogenesis in the mouse. B. Boone, E. Morin-Kensicki, M. Howell, J. Stonebraker, T. Magnuson, W. O'Neal and S. Milgram. Univ. of North Carolina at Chapel Hill.
- 229 B222 Cloning, embryonic expression analysis and targeting of the mouse *Gbx1* gene. S.T. Waters, C.P. Wilson and M. Lewandoski. NCI-Frederick, Natl. Inst. of Hlth., Frederick, Maryland.
- 230 B223 Notch signaling is implicated in rhombomere boundary patterning. Y. Cheng, Q. Xu, M. Amoyel and D. Wilkinson. Natl. Inst. for Med. Res., London, UK.
- 231 B224 Haploinsufficiency of *Smad1* results in abnormal midbrain/hindbrain development. M. Hester, J.C. Thompson, J. Mills and M. Weinstein. Ohio State Univ., Columbus Ohio.
- 232 B225 The role of frizzled 5 signaling during early eye development. C.J. Burns, T. Ishikawa, M.M. Taketo, S. Fuhrmann and M.L. Vetter. Univ. of Utah Sch. of Med., Salt Lake City, Banyu Tsukuba Res. Inst. (Merck), Tsukuba,, Grad. Sch. of Med., Kyoto Univ., Kyoto, Grad. Sch. of Pharmaceut. Sci., The Univ. of Tokyo, Tokyo, Japan.
- 233 B226 Kahoista is required for somitogenesis and formation of a single heart tube in the mouse embryo. A.S. Rakeman and K.V. Anderson. Sloan Kettering Inst., New York, NY and Cornell Univ., New York, NY.
- 234 B227 A caudal-rostral wave of RALDH2 conveys antero-posterior information to the cardiac field. T. Hochgreb, V.F.L. Linhares, D.C. Menezes, A.C. Sampaio, N. Rosenthal and J. Xavier-Neto. Laboratório de Genética e Cardiologia Molec. InCor-HC FMUSP São Paulo, Brazil.
- 235 B228 Effect of hypoxia on zebrafish embryo development. H. Shang and R. Wu. City Univ. of Hong Kong.
- 236 B229 The role of *bruno-like 2* in early zebrafish development. S.M. Byrd and R.K. Ho.] The Univ. of Chicago. The Univ. of Chicago.
- 237 B230 The role of *alk8* in zebrafish development. T.L. Payne-Ferreira and P.C. Yelick. Harvard Sch. of Dent. Med., Boston, MA.
- 238 B231 Role of tolloid in regulating chordin function in the zebrafish gastrula. S. Fisher and J. Xie. Johns Hopkins Univ. Sch. of Med., Baltimore, MD.
- 239 B232 Redundant tolloid-related enzymes regulate chordin activity in the zebrafish embryo. J. Xie and S. Fisher. Johns Hopkins Univ. Sch. of Med., Baltimore, MD.
- 240 B233 Zebrafish *colgate*-mediated inhibition of Wnt signaling is required for early dorso-ventral and neuroectoderm patterning. R.M. Nambiar and P.D. Henion. Ohio State Univ., Columbus, OH.
- 241 B234 Wnt8 functions through Vent and Vox during dorsoventral patterning of the zebrafish embryo. M. Ramel, G. Bucklesx and A. Lekven. Texas A&M Univ., College Station, TX.
- 242 B235 A genetic screen for new mutations that disrupt dorsoventral patterning in zebrafish. N. Sternheim, H.L. Stickney, Y. Imai and W.S. Talbot. Stanford Univ. Sch. of Med.
- 243 B236 Are Ephs important for adhesion in the developing hindbrain? J.E. Cooke and C.B. Moens. HHMI and FHCRC, Seattle WA.



- 244 B237 Withdrawn
- 245 B238 Requirements for retinoic acid in the zebrafish hindbrain. A. Nunez and T. Schilling. Univ. of California, Irvine.
- 246 B239 Genomic characterization and cloning of the zebrafish neural crest mutant, *alyron*. M.J. Juryneec, K. Hoshijima, N. Bahary and D.J. Grunwald. Univ. of Utah, Salt Lake City and DFCI/Children's Hosp., Harvard Univ., Boston, MA.
- 247 B240 Patterning the zebrafish cranial neural crest and the role of endothelin signaling. S. Nair and T. Schilling. Univ. of California, Irvine.
- 248 B241 Production of maternal-zygotic mutant zebrafish by germ-line replacement. B. Ciruna, G. Weidinger, H. Knaut, B. Thisse, C. Thisse, E. Raz and A.F. Schier. Skirball Inst. of Biomolec. Med., NYU Sch. of Med., MPI for Biophys. Chem., Goettingen, Germany, MPI for Develop. Biol., Tuebingen, Germany and IGBMC, CU de Strasbourg, France.
- 249 B242 A contractile actomyosin network drives cortical flows that establish and maintain Par domains and AP polarities in the early *C. elegans* embryo. E.M. Munro, J. Nance and J. Priess. Ctr. for Cell Dynamics, Friday Harbor, WA and FHCRC, Seattle, WA.
- 250 B243 Anterior-posterior polarity in *C. elegans*: a role for spatially and temporally-regulated protein degradation. G. Seydoux, C. Derenzo and J. Pellettieri. Johns Hopkins Univ. Sch. of Med., Baltimore, MD.
- 251 B244 The *scu-1* gene is required for anterior-posterior axis specification and meiotic exit in the early *Caenorhabditis elegans* embryo. R. Lyczak, S. Kirkegaard and B. Bowerman. Ursinus Col., Collegeville, PA and Univ. of Oregon, Eugene, OR.
- 252 B245 Left-right asymmetry, handedness, and *spn-1* function in early *C. elegans* embryos. W.B. Wood, R. Rivera and D. Bergmann. Univ. of Colorado, Boulder and MPI-CBG, Dresden, Germany.
- 253 B246 Mutagenesis screening in the Ascidian *Ciona savignyi*. J. Tresser, D. Jiang and W. Smith. Univ. of California, Santa Barbara.
- 254 B247 The activity gradient of Dpp in the early *Drosophila* embryo is formed by directed, long-range ligand diffusion. Y-C. Wang and C. Ferguson. Univ. of Chicago, Chicago IL.
- 255 B248 Roles for *ik2*, a *Drosophila* I $\kappa$ B kinase, in anterior-posterior and dorsal-ventral embryonic patterning. R.S. Shapiro and K.V. Anderson. K.Sloan-Kettering Inst. and WGSMS at Cornell Univ., New York. N
- 256 B249 Genetic interaction between dispatched and Hh signaling components genetic interaction between dispatched and Hh signaling components. H. Tian and A.P. McMahon. Harvard Univ.
- 257 B250 Analysis of apoptotic cell death caused by maternal-effect lethal mutations in *Drosophila*. A. Bergmann, C. Werz, A. Yang and C. Bolduc. MD Anderson Cancer Ctr.
- 258 B251 Calcium and CaM kinase II are involved in polarization and germination of *Silvetia compressa* zygotes. R. Pu and K.R. Robinson. Kean Univ., Union, NJ and Purdue Univ., W. Lafayette, IN.
- 259 B252 Par1 and par6 homologs in the leech *Helobdella robusta*. X. Ren and D.A. Weisblat. Univ. of California, Berkeley.

## Cell Fate Specification

- 260** B253 *toast*<sup>b460</sup> is required for neural crest development and hematopoiesis in zebrafish embryos. M. An and P.D. Henion. Ohio State Univ., Columbus, OH.
- 261** B254 Regulation of zebrafish neural crest cell fate by *foxd3* and *mitfa*. J.A. Lister, K. Nguyen, M. Modrell and D.W. Raible. Univ. of Washington, Seattle, WA.
- 262** B255 Sox10 participates in the early development of neural crest by controlling its specification and survival. S.M. Honoré, M. Aybar and R. Mayor. HHMI and MNDB, Fac. Sci., Univ. of Chile.
- 263** B256 Early events in neural crest cell induction: specification, markers, and signals. M.I. Garcia-Castro, M. Basch and M. Bronner-Fraser. California Institute of Technology.
- 264** B257 Chordin and Noggin function as BMP antagonists in vivo to regulate mammalian neural crest development. R.M. Anderson, R.W. Stottmann and J. Klingensmith. Duke Univ. Med. Ctr., Durham, NC.
- 265** B258 Graded potential of neural crest to form cornea, sensory neurons and cartilage along the rostrocaudal axis. P. Lwigale, G. Conrad and M. Bronner-Fraser. California Inst. of Technol. and Kansas State Univ.
- 266** B259 Genomic and functional analyses of neural crest induction. L.S. Gammill, C. Gonzalez and M. Bronner-Fraser. California Inst. of Technol., Pasadena, CA.
- 267** B260 Transcription factor AP-2 knockdown in zebrafish embryos disrupts head skeleton, autonomic neurons, and melanocytes. E.K. O'Brien, C. d'Alencon, J. Schoenebeck, J.C. Murray, M.L. Allende, B.D. Gelb, D. Yelon, J.S. Eisen and R.A. Cornell. Univ. of Iowa Col. of Med., Univ. of Chile, Santiago, Skirball Inst. of Biomolec. Med., NYU Sch. of Med., Mt. Sinai Sch. of Med., New York and Univ. of Oregon, Eugene.
- 268** B261 Notch signaling in differentiation of neuronal precursor cells. K. Piltti, S. Kuure, S. Vainio, H. Sariola and K. Wartiovaara. Biomedicum Helsinki, Univ. of Helsinki and Univ. of Oulu, Finland.
- 269** B262 Notch activation induces apoptosis in neural progenitor cells through a p53-dependent pathway. X. Yang, R. Klein and J. Shen. Brigham and Women's Hosp., Harvard Med. Sch.
- 270** B263 Studies on the role of *Lmx1b* and *Nurr1* in the Development of Midbrain DA neurons. J. Kele, A. Hall, H. Mira and E. Arenas. MBB, Karolinska Inst.
- 271** B264 Neurogenesis and proliferation control by *Her5* at the midbrain-hindbrain boundary. A. Geling, P. Chapouton, A. Tallafuss and L. Bally Cuif. TUM and GSF-IDG, Ingolstaedter Landstr., Neuherberg, Germany.
- 272** B265 Absence of motoneurons in the caudal part of the avian spinal cord is induced by the local environment. N. Afonso and M. Catala. CNRS UMR 7000/Univ. of Paris.
- 273** B266 Analysis of the Wnt signaling pathway in cell fate decisions in the developing spinal cord of zebrafish. J. Bonner, M. Grierson and R.I. Dorsky. Univ. of Utah.
- 274** B267 Specification and patterning of zebrafish interneurons. J. Bates, J.S. Eisen and K.E. Lewis. Univ. of Oregon, Eugene.
- 275** B268 The role of paraxial mesoderm in patterning zebrafish primary motoneurons. K.E. Lewis and J.S. Eisen. Univ. of Oregon, Eugene.

- 276 B269 Coordinated temporal and spatial control of motor neuron and serotonergic neuron generation from a common pool of CNS progenitors. A. Pattyn, A. Vallstedt, J.M. Dias, O. Abdel Samad, R. Krumlauf, F.M. Rijli, J-F. Brunet and J. Ericson. Karolinska Inst., Stockholm, CNRS UMR8542, Paris, CNRS/INSERM/ULP, Col. of France, Strasbourg and Stowers Inst., Kansas City.
- 277 B270 The segmental columnar identity of spinal motor neurons is dependent upon the status of retinoid receptor activation. S. Sockanathan and T.M. Jessell. Johns Hopkins Sch. of Med. and HHMI, Columbia Univ.
- 278 B271 Oligodendrocyte precursor specification in the chick spinal cord: implication of a high level of Shh activity and identification of C-Sulf1 as a new marker of the oligodendrocyte lineage. C. Danesin, N. Escalas, X. Ai, C. Emerson and C. Soula. UMR5547 and CNRS/UPS, France.
- 279 B272 Developmental defects in cerebral cortex and olfactory bulb demonstrate a crucial role of Vax1 during the development of the telencephalon. P. Tagliatela, J.M. Soria and S. Bertuzzi. Dulbecco Telethon Inst. at CNR-ITB, Segrate, Italy and Newron Pharmaceut., Gerezano, Italy.
- 280 B273 Rhombomere-specific regulation of first-order relay visceral sensory interneurons. G.O. Gaufo, S. Wu and M.R. Capecchi. Univ. of Utah Salt Lake City, UT.
- 281 B274 Axon segmental border crossing in the *Drosophila* CNS is regulated by *nerfin-1*. A. Kuzin, C. Stivers, T. Brody and W. Odenwald. NINDS, NIH, Bethesda, MD.
- 282 B275 Tumor suppressor protein discs-large (Dlg) and its interactor partner of inscuteable (Pins) play important role in *Drosophila* brain development. A. Radovic and P.J. Bryant. Univ. of California, Irvine.
- 283 B276 Fate of ventricular zone derived aggrecan-expressing cells in culture. M.S. Domowicz, J.G. Henry, M.M. Mueller and N.B. Schwartz. Univ. of Chicago, Chicago, IL.
- 284 B277 Regulation of in vitro fate specification of gonadotropin-releasing hormone neurons by FGF signaling. J.C. Gill and P. Tsai. Univ. of Colorado, Boulder, CO.
- 285 B278 Rx1 and Pax6 in dopamine amacrine cell fate specification. N.A. Zaghloul and S.A. Moody. George Washington Univ., Washington, D.C.
- 286 B279 Pax6 and Hes1 transcription factors direct retinal neuron identity. C.N. Stair, G.T. Philips, H.Y. Lee, E. Wroblewski, N.L. Brown and G.S. Mastick. Univ. of Nevada, Reno and Children's Hosp. Res. Fndn., Cincinnati, OH.
- 287 B280 Lineage analysis of math5-expressing precursors in retina. Z. Yang and L. Gan. Univ. of Rochester Med. Center.
- 288 B281 Precocious retinal neurons: Pax6 and Hes1 regulate the timing of retinal neurogenesis in mice. G.S. Mastick, G.T. Philips, C.N. Stair, H. Young Lee, E. Wroblewski and N.L. Brown. Univ. of Nevada, Reno, Childrens Hosp. Res. Fndn., Cincinnati, OH.
- 289 B282 Retinal cell-fate determination: importance of intracellular developmental programs. M. Cayouette, B.A. Barres and M. Raff. Univ. Col. London, London and Stanford Univ.
- 290 B283 Zaf1 function in cell fate specification in the retina. L. Ma, N. Klenin, L. Journot, S. McFarlane and C. Schuurmans. Hlth. Sci. Ctr., Univ. of Calgary, Canada.

- 291** B284 Use of transgenic *Xenopus* embryos to identify critical regulatory regions in the Xath5 promoter. D.A. Hutcheson, N. Brown and M.L. Vetter. Univ. of Utah Sch. of Med., Salt Lake City and Childrens Hosp. Res. Fndn., Cincinnati, OH.
- 292** B285 Role of murine *Irx2* and *Irx5* homeobox genes during the development of CNS and neural retina. M. Lebel, C.W. Cheng, V. Thanabalasingham, X. Zhang, S.H. Cheng and C-C. Hui. Hosp. for Sick Children, Univ. of Toronto and City Univ. of Hong Kong.
- 293** B286 Role of *XBH1* in ganglion cell fate commitment within the *Xenopus* retina. L. Poggi, T. Vottari, J. Wittbrodt, G. Barsacchi and R. Vignali. Univ. of Pisa, Italy and EMBL, Heidelberg, Germany.
- 294** B287 VegT, a vegetal maternal molecule, represses retinal development in *Xenopus*. B. Yan and S.A. Moody. George Washington Univ., Washington, DC.
- 295** B288 Zebrafish *Lmo4* genes function in subdivision of the optic vesicle. M.E. Lane, D. Ji and C. McCollum. Rice Univ.
- 296** B289 Identification of ganglion cell-specific progenitor cells in developing zebrafish retina. A.J. Udvadia. Duke Univ.
- 297** B290 Zebrafish *lmo4* co-orthologs in embryonic development. C. McCollum and M.E. Lane. Rice Univ.
- 298** B291 FGF signaling is required for neuroblast determination during otic development. B. Alsina, M. Coll, E. Ulloa, C. Pujades and F. Giraldez. Biol. del Desenvolupament, DCEXS-Universitat Pompeu Fabra, Barcelona, Spain.
- 299** B292 An intricate choreography of cell movements is involved in the formation of the chick olfactory placode. S. Bhattacharyya, M. Bronner-Fraser and A. Streit. California Inst. of Technol., Pasadena and King's Col., London, UK.
- 300** B293 The *C. elegans Otx-related* genes specify distinct sensory neuron identities. A. Lanjuin, M.K. VanHoven, C.I. Bargmann, J.K. Thompson and P. Sengupta. Brandeis Univ., Waltham MA and HHMI, San Francisco, CA.
- 301** B294 Cell fate specification along the A-P axis of the intermediate mesoderm. H. Barak, L. Rosenfelder, T. Schultheiss and R. Reshef. Technion, Haifa, Israel and Beth-Israel Deaconess Med. Ctr. and Harvard Med. Sch., Boston, MA.
- 302** B295 BMP signaling regulates mesoderm patterning in mouse embryogenesis. S. Miura, S. Davis, J. Klingensmith and Y. Mishina. NIEHS/NIH, Res. Triangle Park, NC and Duke Univ. Med. Ctr., Durham, NC.
- 303** B296 Regulation of cardiac differentiation by cell adhesion molecules. R. Ausborn, S. Zwenger and D.A. Hinton. Fort Hays State Univ., Hays, KS.
- 304** B297 Notch promotes epithelial-mesenchymal transitions during heart development and transformation. J.L. la Pompa, L.A. Timmerman, J. Grego, J.M.A. Raya, F. McCormick and J.C. Izpisua-Belmonte. Inst. Oncol. Res., Barcelona, Spain, UCSF Cancer Center, San Francisco, Univ. of Malaga, Malaga, Spain and The Salk Inst., La Jolla, CA.
- 305** B298 Roles of cysteine-rich lim proteins (crps) in cardiovascular lineage specification. D.F. Chang, Z. Wang and R.J. Schwartz. Baylor Col. of Med., Houston, TX.

- 306** B299 The role of Prox1 in the specification of lymphatic endothelial cell fate. N. Harvey and G. Oliver. St Jude Childrens Res. Hosp., Memphis, TN.
- 307** B300 PPARgamma ligands promote human leukemia NB4 cells to myeloid differentiation. E. Yasugi, A. Horiuchi, E. Okuma, M. Nakatsu, K. Saeki, I. Uemura and A. Yuo. Intl. Med. Ctr. of Japan, Intl. Christian Univ., Tokyo Metro. Univ., Tokyo, Japan.
- 308** B301 What prevents *Xenopus* primordial germ cells from entering an endodermal fate? M.L. King and T. Venkataraman. Univ. of Miami Sch of Med.
- 309** B302 Regulation of tra-1 by sex-specific phosphorylation, processing, and nuclear localization. M. Schvarzstein and A.M. Spence. Univ. of Toronto, Canada.
- 310** B303 Homeoproteins in prostate development. K. Economides, Y. Hu, M. Reynon, S. Price, N. Desai, M. Shen and C. Abate-Shen. UMDNJ-Robert Wood Johnson Med. Sch., Piscataway, NJ; HHMI, Univ. of Utah.
- 311** B304 Endothelial cell signaling. O. Cleaver and D. Melton. Harvard Univ.
- 312** B305 Withdrawn
- 313** B306 Expansion of Nestin-positive precursors in embryonic pancreas by TGF- $\alpha$ . F. Esni and S.D. Leach. Johns Hopkins Univ.
- 314** B307 Response of single cells to growth factors. F.C. Wardle and J.C. Smith. Wellcome Trust/Cancer Res. UK Inst., Cambridge, UK.
- 315** B308 Myosin heavy chain expression in embryonic, adult and regenerating muscle in zebrafish. Y.F. Chan, D.A. Fernandez and S.H. Devoto. Wesleyan Univ., Middletown, CT.
- 316** B309 Dlx5 regulates chondrocyte differentiation at multiple stages. G. Levi and A.J. Bendall. CNRS UMR, Lab. de Physiologie, Paris and Univ. of Guelph, dOntario, Canada. N
- 317** B310 Pax3 misexpression in chicken embryonic fibroblast cells induces cellular differentiation associated with epithelial to mesenchymal cell transition during embryogenesis. J.R. Bradshaw and M.R. Stark. Brigham Young Univ.
- 318** B311 Mouse intraflagellar transport proteins regulate Hedgehog signaling. D. Huangfu, A. Rakeman and K. Anderson. Sloan-Kettering Inst., Cornell Univ.
- 319** B312 The disintegrin-like AmpA protein acts to regulate cell fate specification in *Dictyostelium discoideum*. H. Ho, T. Varney and D. Blumberg. Univ. of Maryland Baltimore County.
- 320** B313 Notch and Wnt signaling in early leech development. F.C. Gonsalves and D.A. Weisblat. Univ. of California, Berkeley.
- 321** B314 Analyzing the role of *Drosophila* Neuralized in Notch-mediated lateral inhibition. C. Commisso and G. Boulianne. Hosp. for Sick Children, Univ. of Toronto, Toronto, Ontario, Canada.
- 322** B315 The role of *extramacrochaetae* in the development of stalk and polar cells in the *Drosophila* ovary. J.C. Adam and D.J. Montell. Johns Hopkins Med. Sch., Baltimore, MD.
- 323** B316 The role of *serpent* and *Abdominal B* in fat cell and muscle specification in *Drosophila melanogaster*. D.K. Hoshizaki and J.M. Miller. Univ. of Nevada.

- 324** B317 Molecular and functional characterization of a novel RING-protein in *Drosophila* eye development. C. Jones, R. Reifegerste and K. Moses. Emory Univ., Atlanta, GA; Zentrum fuer Molekulare Neurobiologie, Universitaetskrankenhaus Eppendorf, Hamburg, GERMANY.
- 325** B318 Dpp, notch, and ey: control of tissue specification and proliferation in the *Drosophila* eye-antennal disc. K.L. Kenyon, S.S. Ranade and F. Pignoni. Harvard Med. Sch./MEEI.
- 326** B319 A screen for suppressors of *mom-2* TS embryonic lethality. T. Bas, T. Ishidate and C.C. Mello. Univ. of Massachusetts Med. Sch., Worcester, MA and Howard Hughes Med. Inst.
- 327** B320 *C. elegans* pvl-5 maintains epithelial cell identity by preventing *ced-4*-independent apoptosis. P.M. Joshi and D.M. Eisenmann. UMBC, Baltimore, MD.
- 328** B321 Function of a FMRFamide-related neuropeptide gene family in *C. elegans*. K. Kim, N. Tjoe and C. Li. Boston Univ., Boston MA.
- 329** B322 Roles of a *C. elegans* Fer-type non-receptor tyrosine kinase in morphogenesis and Wnt signaling. A.P. Putzke and J.H. Rothman. Univ. of California, Santa Barbara.

## Thursday, July 31st

**7:30–8:45 am: Tutorial by Gene Tools** Salons A–D  
Organizer: Shannon Knuth, Gene Tools, LLC

**8–8:45 am: Funding Opportunities for International Collaborations** Wellesley  
Moderator: Ida Chow, SDB  
Participants: Representatives from NSF, NIH/Fogarty, NASA, Pew, HFSP

## 9 am–12:30 pm: Concurrent Symposia Session I

Symposium 1–From Neuron to Brain Salons A–D  
Chair: Steve Burden, Skirball Inst./NYU

- 330** 9:00 Molecular pathways controlling the assembly of the spinal monosynaptic reflex circuit. S. Hippenmeyer, E. Vrieseling, D.R. Ladle, T. Portmann, T.M. Jessell and S. Arber. Univ. of Basel, Switzerland, Friedrich Miescher Inst., Basel, Switzerland and HHMI, Columbia Univ., New York.
- 331** 9:25 Early induction of the neural crest in *Xenopus*. R. Mayor, S. Villanueva, M. Aybar, A. Glavic, G. Acuña, C. Tríbulo, S.M. Honoré, F. Bastidas and E. Rodriguez. Univ. de Chile.
- 9:40 How do different types of neuron acquire their distinctive dendritic morphology? Y.N. Jan, UCSF
- 332** 10:05 Mind bomb has roles in establishment of proneural domains and in lateral inhibition. A.B. Chitnis, S-Y. Yeo, M. Itoh and C-H. Kim. Natl. Inst. of Child Hlth. and Human Development.
- 333** 10:20 Wnt/Frizzled signalling guides axons along the anterior-posterior axis of the spinal cord. A.I. Lyuksyutova, C-C. Lu, N. Milanesio, L.A. King, N. Guo, Y. Wang, J. Nathans, M. Tessier-Lavigne and Y. Zou. Univ. of Chicago, Johns Hopkins Med. Sch. and HHMI/Stanford Univ.
- 10:35 Break

11:05 Regulation of actin and microtubule dynamics during synapse development. V. Budnik, U Mass

**334** 11:30 Neuromuscular synapse formation. S.J. Burden, X. Yang, R. Herbst, N. Kim and M. Friesse. Skirball Inst. NYU Med. Sch.

11:55 Molecular mechanisms in the perpetuation of memory storage. E. Kandel, Columbia

#### Symposium 2—Organogenesis Salon E

Chair: Cliff Tabin, Harvard

**335** 9:00 Retinoic acid signaling patterns anterior lateral plate mesoderm. B.R. Keegan, J.L. Feldman, G. Begemann, P.W. Ingham and D. Yelon. Skirball Inst., NYU Sch. of Med. and Univ. of Sheffield, UK.

**336** 9:25 FoxC1 and FoxC2 regulate somitic versus intermediate mesoderm fate determination. T. Schultheiss, R. James, B. Hogan and B. Wilm. Beth Israel Deaconess Med. Ctr., Harvard Med. Sch., Boston, MA and Vanderbilt Univ. Sch. of Med., Nashville, TN.

9:40 The kidney as a model organ system. A. McMahon, Harvard

**337** 10:05 A forward genetic approach to understanding endodermal organ formation in zebrafish. E.A. Ober, H. Verkade, H.A. Field, D. Dong, P. Aanstad and D.Y.R. Stainier. Univ. of California, San Francisco.

**338** 10:20 Using conditional gene activation at molecular intersection points to study dorsal hindbrain lineages. R. Awatramani, P. Soriano, C. Rodriguez, J.J. Mai and S. Dymecki. Harvard Med. Sch.

10:35 Break

**339** 11:05 Genetic studies of the propagation of long-range signaling from the ZPA. C. Tabin, B. Harfe, P. Scherz, J. McMahon, A. McMahon and V. Rosen. Harvard Med. Sch., Harvard Univ., and the Forsythe Center.

**340** 11:55 Regulation of synaptogenesis by the cadherin/catenin adhesion machinery. M. Takeichi, H. Togashi and K. Abe. RIKEN Ctr. for Develop. Biol., Kobe, and Grad. Sch. of Biostudies, Kyoto Univ., Kyoto, JAPAN.

#### Symposium 3 - Long Range Signaling and Morphogen Gradients Salons H-K

Chair: Alex Schier, Skirball Inst./NYU

9:00 Nodal signaling: from morphogens to morphogenesis. A. Schier, Skirball Inst./NYU

**341** 9:25 Differential use of an upstream cleavage site in proBMP-4 provides a mechanism for tissue specific regulation of BMP- 4 activity. R. Hackenmiller, T. Nakayama, D.C. Goldman, H. Kulesa, B.L.M. Hogan and J.L. Christian. Oregon Hlth. & Sci. Univ. and Vanderbilt Univ. Med. Sch.

**342** 9:40 The morphogen Sonic hedgehog is an axonal chemoattractant that collaborates with Netrin-1 in midline axon guidance. F. Charron, E. Stein, J. Jeong, A.P. McMahon and M. Tessier-Lavigne. Howard Hughes Med. Inst., Stanford Univ. and Harvard Univ., Cambridge.

**343** 10:05 Transduction of Frizzled signaling by a heterotrimeric GTP-binding protein in *Drosophila*. V.L. Katanaev, R. Ponzielli, M. Semeriva and A. Tomlinson. Columbia Univ., New York and CNRS-INSERM-Univ. de la Mediterranee, Marseille, France.

**344** 10:20 Antagonists of hedgehog signaling and dorsal-ventral neural patterning. J. Eggenchwiler, O. Bulgakov, T. Li and K.V. Anderson. Princeton Univ., MEEI/Harvard Med. Sch., Sloan Kettering Inst.

10:35 Break

**345** 11:05 Morphogenetic signaling and the endocytic pathway. M.A. González-Gáitan. MPI for Molec. Cell Biol. and Genetics, Dresden, Germany.

11:30 Tails of travel with nanos RNA. E. Gavis, Princeton

**346** 11:55 Control of cell proliferation and apoptosis by the bantam microRNA. J. Brennecke, D. Hipfner, A. Stark, R. Russell and S. Cohen. EMBL.

12:30 pm: Lunch on each own

1–3 pm: Poster Session I

Odd number board authors present posters on 7/30, 9–11pm.

Even number board authors present posters on 7/31, 9–11pm.

2:30–3 pm: Break

2:30–3 pm: SDB Business Meeting Salon E

### 3–5 pm: Concurrent Symposia Session II

Symposium 4 - Integrating Signals Salon E

Chair: Eddy De Robertis, UCLA

**347** 3:00 Neural induction in *Xenopus*. E.M. De Robertis, H. Kuroda, B. Reversade, M. Oelgeschlädger, E. Pera, A. Ikeda, O. Wessely, L. Zakin and C. Coffinier. UCLA.

**348** 3:25 Convergence of p53 and Smad in TGF-beta induced transcription. M. Cordenonsi, S. Dupont, S. Maretto, A. Insinga, C. Imbriano and S. Piccolo. Univ. of Padua, European Inst. of Oncol., Milan, Univ. of Modena, Italy.

3:40 How does the embryo coordinate cell movements and cell fate? Integrating different roles of FGF signaling. C. Stern, Univ. Coll. London, U.K.

**349** 4:05 Genetic dissection of pattern and chamber formation in the developing mammalian heart. R.P. Harvey, D. Lai, D. Elliott, M. Solloway, C. Biben, O. Prall and F. Stennard. Victor Chang Cardiac Res. Inst., Victoria St., Darlinghurst Australia.

4:20 Combinatorial activities of effectors of the nodal pathway control A-P patterning in the mouse embryo. L. Robertson, Harvard

**350** 4:45 The hypoxic response in *Drosophila* depends on the bHLH-PAS protein Similar and the prolyl-4-hydroxylase, Fatiga that operates as an oxygen sensor. P. Wappner, M. Irisarri, S. Lavista-Llanos, J.A. Mondotte and L. Centanin. Fundación Instituto Leloir Patricias Argentinas, Buenos Aires, Argentina.

Symposium 5 - Death as Means of Patterning Salons A–D

Chair: Gary Ruvkun, Harvard

**351** 3:00 The role of reaper and sickle in developmental apoptosis. C. Peterson, R. Patel, G. Carney, B. Taylor and K. White. CBRC, Massachusetts Gen. Hosp./Harvard Med. Sch. and Oregon State Univ.

**352** 3:25 Regulation of cell death by pax-3 during neural tube development. S. Thirumangalathu and M.R. Loeken. Joslin Diabetes Ctr. and Harvard Med. Sch.



3:40 Repression of apoptosis during *C. elegans* development. J. Rothman, UC Santa Barbara

**353** 4:05 PTEN tumor suppressor: development and disease. H. Wu, M. Groszer, G. Li and X. Liu.  
Howard Hughes Med. Inst., UCLA Sch. of Med.

4:30 Aging genetics of *C. elegans*. G. Ruvkun, Harvard

Symposium 6 - Gene Regulation- RNA Salons H-K

Chair: Phil Zamore, U Mass Med Sch

**354** 3:00 Ancient pathways programmed by small RNAs. P.D. Zamore. Univ. of Massachusetts Med. Sch.

**355** 3:25 The *Drosophila* *sde3* homologue armitage is essential for axial polarization of the oocyte microtubule cytoskeleton and translational repression of oskar mRNA. H.A. Cook, B.S. Koppetsch and W.E. Theurkauf. Univ. of Massachusetts Med. Sch.

**356** 3:40 Targets and functions of plant microRNAs. B.J. Reinhart, M.W. Rhoades, E.G. Weinstein, L.P. Lim, C.B. Burge, B. Bartel and D.P. Bartel. Whitehead Inst. of BioMed. Res., Cambridge, MA, MIT, Cambridge, MA and Rice Univ., Houston, TX.

**357** 4:05 The *Arabidopsis* heterochronic gene ZIPPY is an ARGONAUTE family member. C. Hunter, G. Wu, H. Sun and R.S. Poethig. Univ. of Pennsylvania, Philadelphia.

**358** 4:20 Systemic RNAi and the intercellular transport of RNA. C.P. Hunter, W. Winston, E. Feinberg, M. Sutherlin, C. Molodowitch, F. Chu and C. Ferguson. Harvard Univ.

**359** 4:45 Quaking-6 regulates GLI1 translation through the 3'UTR. O. Lakiza, E. Villavicencio, D. Walterhouse, E.B. Goodwin and P. Iannaccone. Northwestern Univ. Feinberg Sch. of Med., Chicago, IL and Univ. of Wisconsin, Madison.

5 pm: Dinner on each own

5-6 pm: Meet the SDB Directors Reception for students and postdoctoral fellows Suffolk

7-9 pm: Plenary Session I Salons A-E

Regulation of Cell Proliferation and Size Control

Chair: Marc Kirschner, Harvard

7:00 TBA. M. Kirschner, Harvard

**360** 7:30 Genes that restrict growth and cell proliferation in *Drosophila*. I. Hariharan, E. Buff, S. Cigizoglu, L. Edelmann, K. Harvey, P. Lueras, L. Madden, K. Moberg, B. Pellock, C. Pflieger, S. Schelble, N. Tapon and K. Tseng. Massachusetts Gen. Hosp. Cancer Ctr.

8:00 Regulation of muscle growth by myostatin. S.J. Lee, Johns Hopkins.

8:30 Dissection of the dTOR/dS6K signaling pathway in development and growth. G. Thomas, F. Miescher Inst., Switzerland

9-11 pm: Poster Session I University Hall

Odd number board authors present posters on 7/30, 9-11pm.

Even number board authors present posters on 7/31, 9-11pm.

Tear down posters at the end of the session

**Friday, August 1st****7:30–8:45 am: SDB BOD and DB Editors breakfast meeting Sufflok****8–8:45 am: NIH Stem Cell Task Force and Sponsored Activities**      Salons A–D

Jim Battey, NIH Stem Cell Task Force Chair

**9 am–12:30 pm: Concurrent Symposia III**

## Symposium 7 - Molecular Mechanisms of Cell-cell Signaling      Salon E

Chair: Philip Benfey, Duke

- 9:00      Hedgehog signaling in development and disease. P. Beachy, Johns Hopkins
- 361**      9:25      Slalom encodes a paps transporter essential for segment polarity and dorsal-ventral axis determination in *Drosophila*. F. Lüders, H. Segawa, D. Stein, E.M. Selva, N. Perrimon, S.J. Turco and U. Häcker. Lund Univ., Univ. of Kentucky, Univ. of Texas and Harvard Univ./HHMI.
- 9:40      Rhomboids and EGF receptor signaling. M. Freeman, MRC Cambridge, U.K
- 362**      10:05      Nodal signaling specificity revealed by DNA microarray and phylogenetic footprinting analyses. K.W.Y. Cho, T. Hayata, S. Ogata, Y. Shin, D. Kibler, S. Hampson, A. Liao, Q. Zeng, P. Jablonski and M. Trunnell. Univ. of California, Irvine and GeneData (USA), Inc., Waltham, MA.
- 363**      10:20      A genetic link between intraflagellar transport proteins and Hh signaling in mouse. A. Liu, D. Huangfu, N. Murcia, L. Niswander and K. Anderson. HHMI and Sloan Kettering Inst., New York and Case Western Reserve Univ., Cleveland, OH.
- 10:35      Break
- 364**      11:05      Radial patterning in arabidopsis: a moving target. P.N. Benfey, K. Gallagher, A. Paquette, K. Nakajima and G. Sena. Duke Univ.
- 365**      11:30      Positional information and cell behavior during zebrafish somite segmentation: roles of Fgf signal and T-box genes. H. Takeda. Univ. of Tokyo
- 11:55      Multiple levels of cell-cell signaling in plant reproduction. U. Grossniklaus, Univ. of Basel, Switzerland

## Symposium 8 - Asymmetry: From Cell to Organisms      Salons A–D

Chair: Richard Losick, Harvard

- 9:00      Generating and exploiting asymmetry during development in a bacterium. R. Losick, Harvard
- 366**      9:25      Asymmetric divisions and cell signaling during epidermal cell specification in *Arabidopsis*. D. Bergmann, W. Lukowitz and C. Somerville. Carnegie Inst., DPB, Stanford, CA.
- 9:40      Axis formation in fission yeast. Fred Chang, Columbia
- 367**      10:05      Establishment of left/right asymmetry in the nervous system of *C. elegans*. R.J. Johnston Jr., S. Chang and O. Hobert. Columbia Univ.
- 368**      10:20      One-eyed pinhead and nodal signaling in left-right patterning. R.D. Burdine, S.R. Zimmerman and A.F. Schier. Princeton Univ., NJ and Skirball Inst., NYU Med. Ctr., NY.

10:35 Break

- 369** 11:05 Mechanisms of asymmetric division in *C. elegans* embryos. K. Colombo and P. Gonczy. Swiss Inst. for Exptl. Cancer Res. (ISREC) CH- Epalinges/Lausanne Switzerland.
- 370** 11:30 Mouse gastrulation: Tissue patterning and the emergence of embryonic axes. P.P.L. Tam. Children's Med. Res. Inst., Univ. of Sydney, NSW, Australia.
- 371** 11:55 Cell polarity in *Arabidopsis* trichomes. M. Huelskamp. Univ. of Cologne, Germany.

Symposium 9—Regeneration and Organogenesis Salons H–K

Chair: Lee Niswander, Sloan Kettering

- 372** 9:00 Functional studies of regeneration in the planarian *Schmidtea mediterranea*. A. Sanchez Alvarado, P.W. Reddien, A. Bermange, N. Oviedo and S.M.C. Robb. Univ. of Utah Sch. of Med., Salt Lake City.
- 373** 9:25 Isolation and characterization of planarian stem cells using FACS. K. Agata, M. Asami, N. Shibata, T. Hayashi and R. Okumura. RIKEN CDB., Kobe Japan.
- 9:40 Differentiation and patterning of developing blood vessels—insights from the zebrafish. Brant Weinstein, NICHD
- 374** 10:05 Heart and fin regeneration in zebrafish. K.D. Poss, A. Nechiporuk, S.L. Johnson and M.T. Keating. Children's Hosp., Boston, MA and Washington Univ. Sch. of Med., St. Louis, MO.
- 375** 10:20 Runx2 is required for FGF and Shh signaling during tooth development. X. Wang, T. Aberg, T. Yamashiro and I. Thesleff. Inst. of Biotechnology, Univ. of Helsinki.
- 10:35 Break
- 376** 11:05 Cell growth, lineage switching and patterning during tail regeneration in *Ambystoma mexicanum*. E.M. Tanaka. Max-Planck Inst. of Molec. Cell Biol. and Genetics.
- 377** 11:30 Neural crest cells: patterning and regeneration via stem cells during craniofacial development. P. Trainor, M. Remboutsika and R. Lovell-Badge. Stowers Inst. for Med. Res., Kansas City and Natl. Inst. for Med. Res., London, UK.
- 11:55 Nogo and myelin in the control of axonal plasticity. S. Strittmatter, Yale
- 12:30 pm: Lunch on each own

## 12:30–2:30 pm: Concurrent Workshops

- 1) Imaging and Cell Marking Salon E  
Chair: William Theurkauf, U Mass Med Sch  
Discussants: Rob Singer, Albert Einstein  
Peter So, MIT  
Erik Snapp, NIH
- 2) Genomics/Proteomics Salons A–D  
Chair: Kevin White, Yale

12:30 Morpholino-based screening for gene discovery in zebrafish. S. Ekker, U. Minn.

1:00 Genome-wide RNAi screens for genes involved in *Drosophila* cell viability and morphology. A.Kiger, Harvard

1:30      Toward a genome-wide analysis of protein localization patterns during *Drosophila* oogenesis. L. Cooley, Yale

2:00      Toward an RNAi-based phenotypic map of *C. elegans* embryogenesis. F. Piano, NYU

1–3 pm: Poster Session II

Numbers in *italics* indicate Program Abstract number. **B** numbers indicate poster board number.

Odd number board authors present posters on 8/1, 9–11pm.

Even number board authors present posters on 8/2, 1–3pm.

## Functional Genomics

- 378**      B1      Functional analysis of 25 kb and 95 kb genomic sequences of the human follistatin locus in follistatin knockout mice. S. Lin, M.M. Matzuk, D.M. de Kretser and J.R. Morrison. Monash Inst. of Reprod. and Develop., Monash Univ., Mackay Mem. Hosp., Taipei, Taiwan. Baylor Col. of Med., Texas.
- 379**      B2      Control of monoallelically-expressed genes. E. Allen, S. Diaz-Perez, G. Csankovszki, V. Gallegos, M. Blanco, F. Tong, P. Kraft, R. Jaenisch, S. Horvath and Y. Marahrens. UCLA and Whitehead Inst. for BioMed. Res., Cambridge, MA.
- 380**      B3      A novel Wnt inhibitor, WISE, affects bone density and eye development. D.L. Ellies, A. Economou, B. Viviano, N. Itasaki, S. Saunders and R. Krumlauf. Stowers Inst. for Med. Res., Kansas City, MO, Washington Univ., St. Louis, MO and Natl. Inst. for Med. Res., The Ridgeway, Mill Hill, London, UK.
- 381**      B4      EMAGE - Edinburgh mouse atlas of gene expression. J. Christiansen, S. Venkataraman, A. Waterhouse, D. Houghton, N. Burton, Y. Yang, B. Hill, P. Stevenson, J. Bard, M. Kaufman, R. Baldock and D. Davidson. Univ. of Edinburgh, Edinburgh, UK.
- 382**      B5      Identification of downstream targets of the nodal signaling pathway. J. Bennett, K. Joubin, S. Cheng, P. Aanstad, H. Lehrach and A.F. Schier. Skirball Inst., New York Univ. Sch. of Med. and Max-Planck-Institut for Molec. Genet.
- 383**      B6      Efficient enhancer trapping using sleeping beauty in zebrafish. A.E. Davidson, D. Balciunas, S. Hermanson, Z. Welle, S. Sivasubbu, M.P. Cliff and S.C. Ekker. Univ. of Minnesota, Minneapolis.
- 384**      B7      Design of an 8K *Xenopus* microarray for investigating neural development. V.R. Dondeti, M.A. Wright and M.S. Saha. Col. of William and Mary.
- 385**      B8      mRNA-tagging and microarray experiments to identify *C. elegans* UNC-4 targets. S.E. Von Stetina, P.J. Roy, S.K. Kim and D.M. Miller III. Vanderbilt Univ. Med. Ctr., Nashville, TN, Univ. of Toronto, Toronto, ON, Canada and Stanford Univ. Med. Sch., Stanford, CA.
- 386**      B9      Characterization of the *C. elegans* embryonic regulatory network specified by PAL-1. L. Ryan Baugh, K. Hill-Harfe, A.A. Hill, J.C. Wen, D.K. Slonim, E.L. Brown and C.P. Hunter. Harvard Univ., Cambridge, MA and Wyeth Res., Cambridge, MA.
- 387**      B10      Genome-wide identification of glial-specific genes in *Drosophila* a reverse genetic approach. H. Courvoisier, J. Fak, D. Leaman, U. Unnerstall, N. Rajewsky and U. Gaul. The Rockefeller Univ., New York, NY.
- 388**      B11      Piggybac-based insertional mutagenesis in the presence of stably integrated P elements in *drosophila*. S. Nystedt, M. Padash Barmchi, C. Horn, E.A. Wimmer and U. Häcker. Lund Univ. and Univ. of Bayreuth.

- 389** B12 Microarray analysis of sexual dimorphism in *Drosophila*. M.J. Parisi, R. Nuttall, J. Lu, C. Chan, M. Vainer, J. Minor, A. Lash, S. Eastman, J. Malley, D. Naiman and B. Oliver. NIH, Bethesda, MD, Incyte Genomics, Palo Alto, CA, Natl. Library of Med., Bethesda, MD, Novation Biosci., Palo Alto, CA and Johns Hopkins Univ., Baltimore, MD.

## Molecular Medicine and Development

- 390** B13 Increased local rates of cerebral protein synthesis in fragile X knockout mice. M. Qin, J. Kang and C. Beebe Smith. NIMH, NIH, Bethesda, MD.
- 391** B14 Requirement for Zic2 during mouse neurulation. C. Gaston-Massuet, P. Elms, D. Henderson, R. Arkell and A. Copp. Univ Col. London, UK and Mammalian Genet. Unit, MRC Harwell, Oxfordshire, UK.
- 392** B15 The effect of methylation cycle intermediates on neural tube closure. L.P.E. Dunlevy, A.J. Copp and N.D.E. Greene. Univ. Col. London, UK.
- 393** B16 Vertebrate neurogenesis is counteracted by Sox1-3 activity. M. Bylund and J. Muhr. Ludwig Inst. of Cancer Res., Stockholm Branch.
- 394** B17 Gene expression profiling of apoptosis-sensitive and resistant brain regions in a mouse model for fetal alcohol syndrome. W.C. Dunty, Jr., B. Duong, S. O'Buckley, K.K. Sulik and M.F. Miles. Univ. of North Carolina at Chapel Hill and Virginia Commonwealth Univ., Richmond.
- 395** B18 ESE2 is crucial for the extraembryonic ectoderm. P.L. Pfeffer, H. Davey, A. Beaton and P. L'Huillier. AgResearch, Hamilton, New Zealand.
- 396** B19 A conditional knockout mouse for the OFD type I syndrome: a possible tool for the study of limb development. M.I. Ferrante, A. Barra and B. Franco. TIGEM, Telethon Inst. of Genet. and Med., Naples, Italy.
- 397** B20 Cross-species RNAi: dsRNAs from two *Ascaris* genes sterilize *Caenorhabditis*. G. Gao, S. Raikar, L. Mutapcic, R. Montgomery and K. Bennett. Univ. of Missouri.
- 398** B21 Zebrafish (*Danio rerio*) Caveolin-1a and caveolin-1b: indispensable roles in embryo development. P-K. Fang, K. Solomon, L. Zhuang, M.R. Freeman and P.C. Yelick. Children's Hosp., Harvard Med. Sch., Boston, MA.
- 399** B22 The zebrafish G12 gene is required for nuclear positioning and cell migrations during early development. S.S. Reinsch and G.C. Conway. NASA-Ames Res. Ctr., Moffett Field, CA.

## Stem Cells and Tissue Regeneration

- 400** B23 ES-derived neural progenitor differentiation *in vitro* and *in vivo*. J. Carpentino, S. Becker, J. Thorne, J. Naegele and L. Gabel. Wesleyan Univ.
- 401** B24 The Differentiation of ES cells into neurectoderm and neurons: a role for hedgehog signalling. S. Becker, P. Maye, J. Thorne, H. Siemen, C. Cai, J. Carpentino and L. Gabel. Wesleyan Univ., Middletown, CT.
- 402** B25 Vascular development research using human embryonic stem cells. S. Gerecht Nir, S. Cohen and J. Itskovitz-Eldor. Technion-Israel Inst. of Technol., Rambam Med. Ctr., Haifa, Israel and BGU, Beer-Sheva, Israel.

- 403** B26 Making of spontaneously beating cardiac muscles on biodegradable matrices from embryonic stem cells. J. Song, H.M. Chung, T-S. Hwang, K.Y. Cha, J.K. Park, W.S. Kang, S.P. Yoo, I. Kim and B-S. Kim. Cell and Gene Therapy Res. Inst., Pochon CHA Univ. Col. of Med., Seoul, Korea and Hanyang Univ., Seoul, Korea.
- 404** B27 Development of *in vivo* imaging techniques for trafficking of subventricular zone neural stem cells (SVZSC). M. Owen, J. Bulte, F. Cicchetti, I. Chen, C. Owen, X. Wang, M. Yu, K. Jokivarsi and A. Brownell. Simmons Col., Boston, MA, Johns Hopkins Sch. of Med., Baltimore, MD, CHUL, Ste-Foy, PQ, Canada and Massachusetts Gen. Hosp., Boston, MA.
- 405** B28 The role of E2F-4 transcription factor in regulation of mammalian neural stem cells. V.A. Ruzhynsky, J.L. Vanderluit and R.S. Slack. Univ. of Ottawa.
- 406** B29 p107 Regulates neural stem cell number in the mammalian brain. J.L. Vanderluit, K.L. Ferguson, S. McNamara, J.G. MacLaurin, W.C. McIntosh and R.S. Slack. Ottawa Hosp. Res. Inst., Neurosci. Res. Gp., Univ. of Ottawa.
- 407** B30 Notch signaling promotes FGF-responsive neural stem cell character in the mammalian telencephalon. N. Gaiano, K. Yoon, S. Nery and G. Fishell. Johns Hopkins Univ. Sch. of Med., Baltimore, MD and Skirball Inst./NYU Sch. of MMed., New York.
- 408** B31 Effects of Wnt1 on neural precursor cells. S. Hayashi and A.P. McMahon. Harvard Univ., Cambridge, MA.
- 409** B32 Characterization of neural stem cells derived from human pediatric brain tumors. H.D. Hemmati, I. Nakano, M. Masterman-Smith, A. Lowry, S. Bababeygy, B. Rafii, M. Minera, J. Lazareff, H.I. Kornblum, and M. Bronner-Fraser. UCLA Sch. of Med.
- 410** B33 Neural stem cells induce reprogramming of neural cell types in co-culture accompanied by connexin 43 protein (Cx43) expression in interacting cells. A.R. Alexanian and S.N. Kurpad. Neurosci. Res. Labs, VA Med Ctr., Milwaukee, WI.
- 411** B34 Growth and differentiation of mammalian auditory hair cell progenitors. A. Doetzlhofer, P.M. White, J.E. Johnson, N. Segil and A.K. Groves. House Ear Inst., Los Angeles, Univ. of Southern California, Los Angeles and Univ. of Texas Southwestern Med. Ctr., Dallas, TX.
- 412** B35 Neural stem cell properties and *Xenopus* spinal cord regeneration. K. Sato, A. Corn, R. Karcavich, R.C. Smith and E.A.G. Chernoff. IUPUI Ctr. for Regen. Biol. and Med., Eli Lilly and Co.
- 413** B36 Expression of the *Xenopus* DECD-box RNA helicase, XDDX39, during development and limb regeneration. M. King, A. Mescher, M. Harty, M. Muzinich, R. Smith and A. Neff. IU Sch. of Med., Eli Lilly and Co., IU Ctr. for Regenerative Biol. and Med., Indiana.
- 414** B37 *reg6* is required for branching morphogenesis during blood vessel regeneration in zebrafish caudal fins. C. Huang, N. Lawson, B. Weinstein and S. Johnson. Washington Univ. Med. Sch., St. Louis and NIH, Bethesda.
- 415** B38 Zebrafish fin regeneration as a model system for adult angiogenesis and anti-angiogenic therapy. J. Chan, P.E. Bayliss, G. Whitehead, M. Keating, J.M. Wood and T.M. Roberts. Harvard Med. Sch., Boston, Howard Hughes Med. Inst., Children's Hosp. Boston and Novartis, Pharma AG, Basel, Switzerland.
- 416** B39 Bone patterning is altered in the regenerating zebrafish caudal fin following ectopic expression of *shh* and *bmp* signaling. A. Smith, E. Quint and M.A. Akimenko. Ottawa Hlth. Res. Inst.; Univ. of Ottawa.

- 417 B40 frd5 and frd1 are required for blastema formation in zebrafish caudal fin regeneration. G.G. Whitehead, S. Makino, S. Kim and M.T. Keating. Howard Hughes Med. Inst., Harvard Med. Sch., Children's Hosp., Boston, MA.
- 418 B41 Essential role for *puma* in development of post-embryonic neural crest-derived lineages in zebrafish. N.B. Parker, J.M. Turner and D.M. Parichy. Univ. of Texas, Austin TX.
- 419 B42 Labeling of multipotent progenitor cells in the planarian *Schmidtea mediterranea*. G. Eisenhoffer and A. Sanchez Alvarado. Univ. of Utah Sch. of Med., Salt Lake City.
- 420 B43 Stem cells, regeneration and allometry in the planarian *Schmidtea mediterranea*. N.J. Oviedo and A. Sanchez Alvarado. Univ. of Utah Sch. of Med., Salt Lake City and Ctr. de Biofmsica y Bioquimmica, Instituto Venezolano de Invest. Cientificas, Caracas, Venezuela.
- 421 B44 Studies of *wnt* cascade genes in planarians. C. Kobayashi, K. Mineta, M. Nakazawa, K. Ikeo, T. Gojobori and K. Agata. RIKEN CDB. Cent. Info. Biol.and DDBJ, Natl. Inst. of Genetics.
- 422 B45 An RNAi screen for regeneration genes in the planarian *S. mediterranea*. P.W. Reddien, A. Bermange and A. Sanchez Alvarado. Univ. of Utah, Salt Lake City.
- 423 B46 An rnai screen for regeneration genes in the planarian, *Schmidtea mediterranea*. A.L. Bermange, P.W. Reddien and A. Sanchez Alvarado. Univ. of Utah Sch. of Med., Salt Lake City.
- 424 B47 Role of Meis genes in proximodistal specification during limb regeneration in the *Ambystoma mexicanum*. K. Echeverri, N. Mercader, E.M. Tanaka and M. Torres. Max Planck Inst. for Molec. Cell Biol. and Genet., Dresden, Germany and Univ. Autsonoma, Madrid, Spain.
- 425 B48 Accessory limb formation from skin wounds and nerve deviation. T. Endo, S.V. Bryant and D.M. Gardiner. Univ. of California, Irvine.
- 426 B49 Development of transgenic *Ambystoma mexicanum* to study cell fate during tail regeneration. L. Okoniewska and E.M.Tanaka. MPI-CBG, Dresden Germany.
- 427 B50 An Axolotl EST database: gene information for studying regeneration. B. Habermann, A.-G. Bebin, M. Volkmer, S. Herklotz, K. Eckelt, K. Pehlke, H.H. Epperlein, H.K. Schackert, G. Wiebe and E. Tanaka. Max Planck Inst., PDresden, Germany and Univ. of Dresedn. U
- 428 B51 Patterning the regenerating Axolotl spinal cord: the role of Pax7. L. Mchedlishvili, H.H. Epperlein and E.M. Tanaka. TUD, Med. faculty Carl-Gustav-Carus, Institut of Anat. Fetscherstr., Dresden, Germany +Max Planck Inst. for Molec. Cell Biol. and Genet. Pfotenhauerstrasse, Dresden, GERMANY.
- 429 B52 Purification of a serum factor that drives newt myotubes into S-phase. W.L. Straube, D.N. Drechsel, J.P. Brockes and E.M. Tanaka. Max Planck Inst. of Molec. Cell Biol. and Genet., Dresden and Univ. Col. London, UK.

## Organogenesis

- 430 B53 A morphant screen identifies an essential role for syndecan-2 in vascular development. E. Chen, A. Nielsen, S. Hermanson and S.C. Ekker. Univ. of Minnesota Med. Sch.
- 431 B54 Mutation of *vmhc* disrupts contractility of the embryonic zebrafish ventricle. H. Coleman, E. Berdough, T. Bruno, F. Olale and D. Yelon. Skirball Inst. of Biomolec. Med., New York Univ. Sch. of Med.

- 432 B55 Development of adenosinergic heart rate regulation in wildtype and slow mo mutant zebrafish embryos. K.S. Warren and L.E. Smith. Roger Williams Univ., Bristol, RI.
- 433 B56 The role of MEF2C in cardiac morphogenesis. L. Vong, W. Bi, K. O'Connor, C. Li and J.J. Schwarz. Albany Med. Col., NY.
- 434 B57 Circulation is established in a step-wise pattern in the mammalian embryo. K. McGrath, A. Koniski, J. Malik and J. Palis. Univ. of Rochester.
- 435 B58 Quaking, an RNA binding protein required for proper myelination, is also essential for cardiovascular development. J.L. Northrop, L. Lai, L. Pool, K.K. Hirschi and M.J. Justice. Baylor Col. of Med., Houston, TX.
- 436 B59 The mechanisms of action of ethanol on extraembryonic vascular development: involvement of oxidative stress, retinoic acid signaling and vegf expression. A.C. Tufan and N.L. Satioglu-Tufan. Pamukkale Univ. Sch. of Med., Denizli, Turkey.
- 437 B60 The role of the bHLH transcription factor HAND1 in extraembryonic vasculature development. Y. Morikawa and P. Cserjesi. LSU Hlth. Sci. Ctr., New Orleans, LA.
- 438 B61 An ENU mutagenesis screen to isolate cardiovascular and hematopoietic lethal mutations using a mouse balancer chromosome. K. Hentges, H. Nakamura, M. Alviento, B. Hasson, A. Bradley and M.J. Justice. Baylor Col. of Med. Houston, TX and Sanger Ctr., Cambridge, UK.
- 439 B62 Transgenesis and insertional mutagenesis in *Xenopus*. E. Kuliyeu, M.J. Hamlet, J.R. Doherty, H. Zhu, D.A. Yergeau and P.E. Mead. St. Jude Children's Res. Hosp., Memphis, TN.
- 440 B63 The role of Tbx4 and Hox genes in lung bud formation. J. Sakiyama and A. Kuroiwa. Nagoya Univ., Japan.
- 441 B64 Retinoid regulation of lung bud initiation. T. Desai, S. Malpel and W. Cardoso. Boston Univ. Sch. of Med.
- 442 B65 A forward genetic screen in mice for genes that regulate lung development. C.H. Dean, R. Rivi, E. Lacy, K. Anderson and L.A. Niswander. Mem. Sloan Kettering Cancer Ctr. and Howard Hughes Med. Inst., New York, NY.
- 443 B66 Distinct time windows for FGF signaling during lung morphogenesis. A.K. Perl, B. Spencer-Dene, C. Dickson and J. Whitsett. CCHMC, Ohio, USA, ICRF, London, UK.
- 444 B67 A significant reduction of the diaphragm in mdx:MyoD-/-9th embryos leads to pulmonary hypoplasia. M.R. Inanlou and B. Kablar. Dalhousie Univ., Halifax, NS, Canada.
- 445 B68 *Drosophila* as a model genetic system to evaluate antioxidant effects on pulmonary development. M.L. Reed and L.A. Perkins. Massachusetts Gen. Hosp., Harvard Med. Sch., Charlestown, MA.
- 446 B69 Wnt signaling is required for vertebrate pancreas formation. H.J. Kim, S. Lin and S.C. Ekker. UCLA and Univ. of Minnesota.
- 447 B70 Gain-of-function screening to identify novel genes implicated in early pancreas development in *Xenopus laevis*. F.M. Spagnoli and A.H. Brivanlou. Rockefeller Univ., New York.
- 448 B71 Development of the dorsal pancreatic endoderm requires vascular function. J. Edsbacke, J.K. Johansson, F. Esni, G.L. Radice and H. Semb. Goteborg Univ., Germany, Johns Hopkins Univ., Baltimore, MD and Univ. of Pennsylvania Sch. of Med., Philadelphia.



- 449 B72 Notch signaling inhibits pancreatic endocrine and exocrine development. L.C. Murtaugh, B. Stanger and D. Melton. Harvard Univ.
- 450 B73 The role of HNF6 in pancreatic islet differentiation and mature islet function. E. Tweedie, H. Scrable and M. Gannon,. Vanderbilt Univ. and Univ. of Virginia.
- 451 B74 Transcriptional and functional analysis of genes required for mouse endocrine islet development. G. Gu and D. Melton. Vanderbilt Med. Ctr., Nashville and Harvard Univ., Cambridge, MA.
- 452 B75 Analysis of murine endoderm fate from early somite stages through organogenesis. K.D. Tremblay and K.S. Zaret. Fox Chase Cancer Ctr., Philadelphia, PA.
- 453 B76 Functional analysis of FGF10 expressed in the embryonic chicken stomach. M. Shin and S. Yasugi. Tokyo Metropol. Univ.
- 454 B77 Gradient of JAK/STAT signaling, established by *drm/lin/bowl* hierarchy, is required for cell rearrangement in the *Drosophila* hindgut. K.A. Johansen, D.D. Iwaki, R.B. Green, X.R.D.A. Harrison and J.A. Lengyel. UCLA and Univ. of Kentucky.
- 455 B78 Characterization of *gob-1*: a gene required for intestine development in the nematode *Caenorhabditis elegans*. J.D. Kormish and J.D. McGhee. Univ. of Calgary, Canada.
- 456 B79 Fgf-8 is a key molecule to liver development of *Xenopus laevis*. Y-H. Kim, S-Y. Ko, J-W. Lee and W-S. Kim. Sogang Univ.
- 457 B80 BMP4 is essential for normal development of the enteric nervous system. A.M. Goldstein, A.M. Doyle, J.A. Williams and D.J. Roberts. Massachusetts Gen. Hosp.
- 458 B81 Knockdown of gene function during early mouse thymus organogenesis using morpholino antisense oligonucleotides. J. Gordon, N.R. Manley and C. Clare Blackburn. Univ. of Edinburgh and Univ. of Georgia, Athens.
- 459 B82 Rectal formation in *C.elegans* embryos requires a Lag (Notchlike) pathway signal to initiate *pal-1*(Caudal/cdx) expression in two AB cells. L. Edgar and B. Wood. Univ. of Colorado, Boulder.
- 460 B83 What makes a salivary gland a salivary gland? The transcriptional control of secretory pathway genes in the primary secretory organ of *Drosophila*. E.W. Abrams and D.J. Andrew. Johns Hopkins Univ. Sch. of Med.
- 461 B84 Analysis of the role of the GDNF/GFR alpha-1 signal transduction pathway in the development of the zebrafish kidney. M.L. O'Connell, B. Levy and J. Drawbridge. The Col. of New Jersey, Rider Univ.
- 462 B85 The novel ras/MAPK antagonist, Sprouty1, is essential for normal renal development. M.A. Basson, S. Akbulut, J. Johnson, R. Simon, T.J. Carroll, F. Costantini, T. Lufkin, A.P. McMahon, P.D. Wilson and J.D. Licht. Mount Sinai Sch. of Med., New York, Harvard Univ. and Columbia Univ., New York.
- 463 B86 Molecular characterisation of early mammalian kidney development. G.W. Yip and A.P. McMahon. Harvard Univ. and Natl. Univ. of Singapore.
- 464 B87 Wnt11 and c-Ret/GDNF pathways cooperate in regulating ureteric branching during metanephric kidney development. A. Majumdar, S. Vainio, A. Kispert, J. McMahon and A.P. McMahon. Harvard Univ., Univ. of Oulu, Medizinische Hochschule Hannover.

- 465** B88 Transcriptional profiling of tubulogenesis using Wnt4 mutant mice. M.T. Valerius and A.P. McMahon. Harvard Univ.
- 466** B89 Fgf8 plays a fundamental role in kidney development. A.O. Perantoni, O. Timofeeva, C. Richman, S. Pajni-Underwood and M. Lewandoski. NCI-Frederick, NIH.
- 467** B90 Fgf8 is required for nephrogenesis in the developing mouse kidney. R.M. Ilagan and E.N. Meyers. Duke Univ. Med. Center.
- 468** B91 Wnt signaling in kidney development. T.J. Carroll and A.P. McMahon. Harvard Univ.
- 469** B92 A novel pathway controlling epithelial tube size revealed by an insertional mutagenesis screen for cystic kidney mutants in zebrafish. Z. Sun, A. Amsterdam, G. Pazour and N. Hopkins. MIT and Univ. of Massachusetts Med. Sch.
- 470** B93 Conditional inactivation of the mouse *Lim1* gene in the nephric duct. A. Wilber, S. Wanner and W. Shawlot. Univ. of Minnesota.
- 471** B94 Sexual development of the *Caenorhabditis elegans* gonad. K. Thoemke, W. Chang, J. Illi and D. Zarkower. Univ. of Minnesota, Minneapolis.
- 472** B95 Germline-soma interactions in the embryonic gonad of *Drosophila melanogaster*. A.B. Jenkins and M. Van Doren. Johns Hopkins Univ.
- 473** B96 Specification of the indifferent gonad in the avian embryo. J.B. Scott and T.M. Schultheiss. Beth Israel Deaconess Med. Ctr. and Harvard Med. Sch.
- 474** B97 Molecular basis of sex reversal in mice lacking Insulin receptor family members. S. Verma-Kurvari, S. Nef, A. Efstratiadis, D. Accili and L. Parada. Univ. of Texas Southwestern Med. Ctr., Dallas and Col. of Physicians and Surgeons of Columbia Univ., New York, NY.
- 475** B98 XY sex reversal in *Wt1* +/-, *Sf1* +/- and *Dax1* -/Y mice. K.H. Albrecht, L.L. Washburn, A.K. Recknagel and E.M. Eicher. Boston Univ.stSch. of Med. and The Jackson Lab., Bar Harbor, ME.
- 476** B99 Nuclear localization of FGFR2 acts downstream of Sry and is critical for SOX9-induced Sertoli cell differentiation. B. Capel, Y-N. Kim and J. Schmahl. Duke Univ. Med. Ctr., Durham, NC.
- 477** B100 Local and global signaling in development of the external genitalia. C. Perriton, A. Petiot, C. Dickson and M.J. Cohn. Univ. of Reading, UK, Cancer Res. UK, Lincolns Inn Field, London and Univ. of Florida, Gainesville.
- 478** B101 Outgrowth and apoptosis for the external genitalia formation by concerted functions of Bmp signaling. K. Suzuki, D. Bachiller, Y.P. Chen, M. Kamikawa, H. Ogi, R. Haraguchi, Y. Ogino, Y. Mishina, K. Ahn, E.B. Crenshaw III and G. Yamada. Kumamoto Univ., Honjo, Kumamoto, Japan.
- 479** B102 The role of Edar signaling in ectodermal organogenesis. M.L. Mikkola, T. Mustonen, J. Pispa, M. Ilmonen, J. Laurikkala, M. Pummila, A. Kangas, R. Jaatinen and I. Thesleff. Univ. of Helsinki, Finland.
- 480** B103 Bmpr-ia signaling is required for differentiation and growth of hair during postnatal hair follicle morphogenesis. K. Kwan, A.G. Li, Y. Mishina, X. Wang, D.R. Roop, W. Wurst and R.R. Behringer. UT M.D. Anderson Cancer Ctr., Baylor Col. of Med and Natl. Inst of Envrn. Hlth. Sci.; Max-Planck-Inst. of Psychiatry.

- 481 B104 Runx3 is involved in hair follicle development. S. Cohen, E. Rawe, D. Levanon, Y. Groner and U. Gat. Hebrew Univ., Jerusalem and Weizmann Inst. of Sci., Rehovot.
- 482 B105 Loss of periderm: tightness is guaranteed. M. Saathoff, T. Quast, G. Kirfel and V. Herzog. Univ. of Bonn, Germany.
- 483 B106 Separate nutrient-sensitive and nutrient-resistant physiologies revealed by studies on growth of the zebrafish caudal fin. M.I. Goldsmith, M.K. Iovine and S.L. Johnson. Washington Univ. and Lehigh Univ.
- 484 B107 Ocelot mutation lengthens rest phase during ontogenetic fin growth. M.K. Iovine and C.R. Scott. Lehigh Univ., Bethlehem, PA.
- 485 B108 Skin melanoblasts undergo only initial stages of differentiation in white Japanese silky embryos. H.A. Castillo and C.D. Faraco. Univ. Fed. Parana, Curitiba, Brasil.
- 486 B109 Cellular interactions during adult pigment stripe development in zebrafish. D.M. Parichy and J.M. Turner. Inst. for Cell. and Molec. Biol., Univ. of Texas, Austin TX.
- 487 B110 Withdrawn
- 488 B111 BMP receptor 1A is required in mammalian neural crest cells for development of neural crest derivatives and normal heart function. R. Stottmann, M. Choi, Y. Mishina and J. Klingensmith. Duke Univ. Med. Ctr. and NIEHS.
- 489 B112 Direct hedgehog signaling in the neural crest cells is essential for the normal craniofacial development. J. Jeong, T. Tenzen and A.P. McMahon. Harvard Univ., Cambridge, MA.
- 490 B113 Inactivation of the Alk-2 gene by Wnt1-Cre-mediated deletion results in failure of cranio-facial development. V. Kaartinen, A. Nagy and M. Dudas. Dev. Biol. Prog., Childrens Hosp. Los Angeles.
- 491 B114 Cadmium affects the formation of the notochord in zebrafish embryonic development. S.H. Cheng and E.S.H. Chow. City Univ. of Hong Kong, Kowloon.
- 492 B115 Identification of a gamma A-like protocadherin in the developing chick. A.A. Capehart and C.B. Kern. East Carolina Univ., Greenville and Med. Univ. of South Carolina, Charleston.
- 493 B116 Role of Shh in sensory ganglion formation. N. Fedtsova and E.E. Turner. UCSD, La Jolla, CA and VA Med. Ctr., San Diego, CA.
- 494 B117 Identifying functional interactions between the retinal transcription factors required for specification of the vertebrate eye. M.E. Zuber, A.S. Viczian, G. Gestri, B. Knox, G. Barsacchi and W.A. Harris. SUNY Upstate MMed. Univ., Syracuse, Univ. di Pisa and Univ. of Cambridge, UK.
- 495 B118 Rx is required both for optic vesicle formation and maintenance of retinal cell fate. P. Mathers, V. Voronina, C. Wilson, S. Kozlov and M. Lewandoski. West Virginia Univ., Morgantown, and Natl. Cancer Inst., Frederick, MD.
- 496 B119 *Math5* null mice have abnormal retinal and persistent hyaloid vasculatures. J.A. Brzezinski IV, S.M. Schulz, S. Crawford, E. Wroblewski, N.L. Brown and T. Glaser. Univ. of Michigan. Ann Arbor, Northwestern Univ. Med. Sch. Chicago, IL, Childrens Hosp. Res. Foundation. Cincinnati, OH.
- 497 B120 Interactions during inner ear induction. R. Ladher, S. Boerner and G. Schoenwolf. RIKEN Ctr. for Develop. Biol., Kobe and Univ. of Utah, Salt Lake City.

- 498** B121 Generation of inner ear-specific knockout mice by modification of a Pax-2 bacterial artificial chromosome. T. Ohyama and A. Groves. House Ear Inst., Los Angeles, CA.
- 499** B122 Early development of the otic placode in zebrafish. A. Fritz, K.S. Solomon, T. Kudoh, M.D. Mackereth and I.B. Dawid. Emory Univ., Atlanta, GA and NICHD, Bethesda, MD.
- 500** B123 Insertional mutagenesis screen for genes involved in vestibular/neural development in *Xenopus tropicalis*. M. Torrejon, M. Nguyen, R. Gupta and S. Reinsch. NASA-Ames Res. Ctr., Moffett Field, CA; Natl. Res. Council.
- 501** B124 Hedgehog signaling in zebrafish pituitary development: overlapping and distinct roles for *gli1* and *gli2*. J.L. Sbrogna, O. Tyurina and R.O. Karlstrom. Univ. of Massachusetts, Amherst.
- 502** B125 Is the early Hh transcriptional response conserved between neural and pituitary tissue? B. Guner and R. Karlstrom. Univ. of Massachusetts, Amherst.
- 503** B126 New zebrafish laterality mutants that have altered dorsal forerunner organization and altered localization of *inversin* to monocilia. P.A. Sacayon and H.J. Yost. Ctr. for Children, Hunstman Cancer Inst.
- 504** B127 Roles of the zebrafish nodal-related gene *southpaw* in visceral and brain left-right asymmetry. S. Long, N. Ahmad and M. Rebagliati. Univ. of Iowa Col. of Med., Iowa City.
- 505** B128 Subdividing the embryo: a role for notch signaling. S.P. Coleman and K.A. McLaughlin. Tufts Univ. Medford, MA.
- 506** B129 Control of A-P identity in endoderm by lateral plate mesoderm signals. M. Kumar, N. Jordan, D. Melton and A. Grapin-Botton. Harvard Univ., Cambridge, MA and ISREC, Chemin des Boveresses, Case Postale, CH- Epalinges s/Lausanne, CH.
- 507** B130 Step-wise patterning of trunk mesoderm by Bmp Signals. R.G. James and T.M. Schultheiss. Beth Israel Deaconess Med. Ctr. and Harvard Med. Sch.
- 508** B131 *tortuga*, a zebrafish mutation affecting the segmentation clock. K.K. Dill, J.L. Anderson and S.L. Amacher. Univ. of California, Berkeley, CA.
- 509** B132 Withdrawn
- 510** B133 Developmental regulation of muscle fiber number in zebrafish. S.H. Devoto, X. Feng, J. D'Angelo, F. Stellabotte and D. Fernandez. Wesleyan Univ., Middletown, CT.
- 511** B134 Characterization of *Lmbr1* during chick limb development. S.A. Maas and J.F. Fallon. Univ. of Wisconsin, Madison.
- 512** B135 Ephrin-A/EphA interaction involved in position-specific cell affinity and cartilage differentiation in the limb bud. T. Nohno and N. Wada. Kawasaki Med. Sch., Kurashiki Japan.
- 513** B136 Cloning of Medaka (*Oryzias latipes*) Chondromodulin-I. Y. Nishizaki, C. Shukunami and Y. Hiraki. Inst. for Frontier Med. Sci., Kyoto Univ.
- 514** B137 Scleraxis is a major regulator of tendon formation. R. Schweitzer. Shriners Hosp., Portland, OR.

- 515** B138 mRNA expression of fibroblast growth factor receptor isoforms during murine craniofacial bone and cartilage development. E. Connor, D.P.C. Rice, R. Rice and I. Thesleff. Univ. of Helsinki, Finland and King's Col. London.
- 516** B139 Multiple roles of VEGF during skeletal development. E. Zelzer, T. Kobayashi, H.M. Kronenberg, N. Ferrara and B.R. Olsen. Harvard Med. Sch., Boston, MA.
- 517** B140 Deficiency for dentin matrix protein 1, a specific gene for mineralized tissues, causes osteochondrodysplasia, osteoarthritis and rickets/osteomalacia during postnatal development. Y. Mishina, L. Ye, H. Huang, D. Chen, S. Dallas, T. Kunieda, T.W. Tsutsui, Y. Lu, H-Z. Ke, L.F. Bonewald and J.Q. Feng. Natl. Inst. of Envrn. Hlth. Sci., Res. Triangle Park, NC and Sch. of Dent., Univ. of Missouri-Kansas City.
- 518** B141 Belly spot and tail: a mouse Minute. E.R. Oliver, T.L. Saunders, S.A. Tarle and T. Glaser. Univ. of Michigan.
- 519** B142 Cited1 is required for normal placental development in mouse. D.B. Sparrow, S.L. Withington, A.N. Scott, J. Preis, T. Rodriguez, R.S.P. Beddington and S.L. Dunwoodie. Victor Chang Cardiac Res. Inst., Sydney, Natl. Inst. for Med. Res., London, UK.

### Patterning and Transcription Factor

- 520** B143 *Hoxa5* regional expression along the developing anteropior axis involves CDX proteins as transcriptional regulators. S. Tabariès, J. Lapointe, T. Besch, C.K. Tuggle and L. Jeannotte. Ctr. de recherche de LHttel-Dieu de Québec, Canada and Iowa State Univ., Ames, IA.
- 521** B144 Withdrawn
- 522** B145 Dissecting the regulatory elements of Tbx6 expression during mouse development. D.R. Farkas, P.H. White and D.L. Chapman. Univ. of Pittsburgh.
- 523** B146 The homeobox gene *caudal* is involved in anterior-pior patterning and development of Pior structures in zebrafish. I. Skromne, N. Hopkins and R. Ho. Univ. of Chicago and MIT.
- 524** B147 bHLH factor pMesogenin1 is a transcriptional repressor involved in paraxial mesoderm development. K-S. Park, J-S. Nam and J.K. Yoon. Ctr. for Molec. Med. Maine Med. Ctr. Res. Inst. Scarborough, ME.
- 525** B148 Assigning Pbx function in lateral plate mesoderm patterning. J. Schoenebeck, J.L. Feldman, C.B. Moens and D. Yelon. Skirball Inst. of Biomolec. Med., New York Univ. Sch. of Med. and HHMI, Fred Hutchinson Cancer Res. Ctr., Seattle, WA.
- 526** B149 Identifying *spadetail*- and *no tail*-dependent factors in Pior floor plate formation. T.M. Han and S.L. Amacher. Univ. of California, Berkeley.
- 527** B150 Hoxb1 is required in neural crest for proper development of the VIIth cranial nerve. B. Arenkiel, P. Tvrdik and M. Capecchi. Univ. of Utah, Salt Lake City.
- 528** B151 Zic2 and Zic3 proteins together regulate proneural and neural crest domains in zebrafish. M. Keller, D. Jiang and A. Chitnis. Natl. Inst. of Child Hlth. and Human Development.
- 529** B152 Transcription factor ap2a and patterning of cranial neural crest in zebrafish. R.D. Knight, S. Nair, S.S. Nelson, Y. Javidan and T.F. Schilling. Univ. of California, Irvine.

- 530** B153 A novel chick spalt gene expressed in branchial arches reduces neurogenic potential of the cranial neural crest. M. Barembaum and M. Bronner-Fraser. California Inst. of Technol., Pasadena, CA.
- 531** B154 Identification of Sox9 partner molecules in *Xenopus* neural crest. X. Huang and J. Saint-Jeannet. Sch. of Vet. Med., Univ. of Pennsylvania, Philadelphia.
- 532** B155 The functional role of the Six3 in murine development. O.V. Lagutin, W.A. Liu, J. Topczewski, L. Solnica-Krezel and G. Oliver. St. Jude Children's Res. Hosp., Memphis, TN and Vanderbilt Univ., Nashville, TN.
- 533** B156 Integration of neural patterning and neurogenesis in the developing neural tube. U. Marklund, J. Muhr and J. Ericson. Karolinska Inst., Sweden.
- 534** B157 Expression analysis of Thg-1pit in the mouse central nervous system. S. Canterini, F. Mangia and M.T. Fiorenza. Univ. "La Sapienza" of Rome, Italy.
- 535** B158 Bar-like homeobox genes play a critical role in pre patterning the anterior neural plate through regulation of BMP signaling. B. Durand, H. El-Hodiri and M. Jamrich. Baylor Col. of Med., Houston TX and RTG Institut Pasteur, Paris.
- 536** B159 Change in BMP signaling affects the nuclear organization of the developing chick diencephalon. Y. Lim, J. Minarcik and J. Golden. Univ. of Pennsylvania and the Children's Hosp. of Philadelphia.
- 537** B160 Systematic identification of elements of a neocortical protomap. S.N. Sansom and F.J. Livesey. Wellcome Trust/Cancer Res. UK Inst. of Cancer and Develop. Biol., Univ. of Cambridge.
- 538** B161 The role of the transcription factor Cux2 in craniofacial morphogenesis and neurogenesis. A. Iulianella and P. Trainor. Stowers Inst. for Med. Research.
- 539** B162 Synergy between FGF signaling and the transcription factor *vhnf1* is required during gastrulation for rhombomere specification. E. Wiellette and H. Sive. Whitehead Inst. for BioMed. Res., Cambridge MA.
- 540** B163 Expression of *Zfhep* transcription factor in differentiated neurons of the hindbrain. R.P. Stearman and D.S. Darling. Univ. of Louisville, KY.
- 541** B164 The Nlz zinc-finger protein acts as a repressors to control segmental gene expression in the zebrafish hindbrain. C.G. Sagerstrom and A.P. Runko. Univ. of Massachusetts Med. Sch., Worcester.
- 542** B165 *vhnf1* and *fgfs* synergize to drive *val* expression in the zebrafish hindbrain. R.E. Hernandez, H.A. Rikhof and C.B. Moens. Fred Hutchinson Cancer Res. Ctr. and HHMI.
- 543** B166 Meis dominant-negative approach reveals a mechanism during early hindbrain patterning. S-K. Choe and C.G. Sagerstrom. Univ. of Massachusetts Med. Sch., Worcester.
- 544** B167 Class I HDAC proteins interact with Hox, Pbx and Meis in-vitro. S. Zchut and C. Sagerstrom. Univ. of Massachusetts Med. Sch.
- 545** B168 Neural patterning and retinal specification in a Rx knockout model. E. Kozhemyakina and P. Mathers. West Virginia Univ., Morgantown.
- 546** B169 The Sonic hedgehog signaling pathway in ocular development: specific and complementary roles of the Gli transcription factors. M. Furimsky and V.A. Wallace. Ottawa Hlth. Res. Inst., Ottawa, Ontario, CANADA.

- 547 B170 Dlx1 and Dlx2 homeobox genes regulate vertebrate retinal ganglion cell differentiation. J. de Melo, G. Du, M. Fonseca and D.D. Eisenstat. Univ. of Manitoba, Winnipeg, Canada.
- 548 B171 Wnt/ $\beta$ -catenin signaling in *Xenopus* retinal development. T.J. Van Raay, R.M. Jamrich and M.L. Vetter. Univ. of Utah, Salt Lake City and Baylor Col. of Med., Houston, TX.
- 549 B172 The bHLH-Zip transcription factor *Mitf* is conserved in *Drosophila* and is expressed in the developing eye. J.H. Hallsson, B.S. Haflidadstir, C. Stivers, W. Odenwald, F. Pignoni, H. Arnheiter and E. Steingrimsson. NINDS, NIH.
- 550 B173 Mechanism of Pitx gene regulation during pituitary development. M.A. Charles, H. Suh, P.J. Gage, I. Nasonkin, C. Liu, J. Martin, J. Drouin and S.A. Camper. Univ of Michigan Med Sch, Ann Arbor, Alkek Inst. of Biosciences and Tech, Texas A&M Syst. Hlth. Sci Ctr., Houston and Institut de Recherches Cliniques de Montreal, Quebec.
- 551 B174 Identifying modifier genes that suppress the *Engrailed-1* cerebellar phenotype. C. Murcia, N. Bilovocky, R. Romito-DiGiacomo and K. Herrup. Case Western Reserve Univ., Cleveland, Ohio.
- 552 B175 Motor neuron progenitor specification depends on retinoid receptor-mediated activation of the bHLH factor olig2. B.G. Novitch, H. Wichterle, S. Sockanathan and T.M. Jessell. HHMI, Columbia Univ. and Johns Hopkins Sch. of Med.
- 553 B176 The role of runx genes in Rohon-Beard sensory neuron development in zebrafish. M. Rzaszutak, P. Simpson, D. Riedel and K. Bruk Artinger. Univ. of Colorado Hlth. Sci. Ctr., Denver, CO.
- 554 B177 Sp8, a new Sp family member crucial for limb outgrowth and neural tube closure. S. Bell, C. Schreiner, S. Potter and W. Scott. Cincinnati Children's Hosp. Med. Center.
- 555 B178 Microarray analysis of limb patterning and development. I. Rouzankina, A. Tobey and L. Niswander. Sloan-Kettering Inst. and WGSMS of Cornell Univ.
- 556 B179 Homeotic transformation of first branchial arch and cleft limbs in *dlx5/dlx6* double mutant mice. G. Merlo, S. Mantero, M. Maggioni, A. Beverdam, L. Paleari, F. Genova and G. Levi. CNR-ITB Segrata, Italy, IST, Genova, Italy and CNRS UMR 8572, Paris.
- 557 B180 Evidence in support of a new model of epibranchial placodes as dynamically shrinking and segmenting regions of neurogenic ectoderm. Y. Ishii and P.J. Scotting. Univ. of Nottingham, UK.
- 558 B181 Sonic hedgehog regulates patterning in the pharyngeal region by maintaining pharyngeal pouch identity and morphology. B.A. Moore-Scott and N.R. Manley. Med. Col. of Georgia and Univ. of Georgia.
- 559 B182 Functional analysis of zebrafish *dlx* gene expression in the pharyngeal arches. S. Sperber and M. Ekker. Ottawa Hlth. Res. Inst., Univ. of Ottawa, Canada.
- 560 B183 Understanding the interaction between MEIS and AbdB-like HOX proteins: nature of interaction and *in vivo* applicability. T.M. Williams, M.E. Williams and J.W. Innis. Univ. of Michigan, Ann Arbor.
- 561 B184 Genetic and nutritional modifiers of Hox gene function. C. Kappen. Univ. of Nebraska Med. Ctr., Omaha, NE.
- 562 B185 Using transcription activation mutants to identify Hox gene targets *in vivo*. E.K. Engelhardt, S.E. Bondos and K.S. Matthews. Rice Univ., Houston, TX.

- 563** B186 *Hoxc13b* expression pattern and function in early zebrafish development. R. Thummel, L. Li, M. Sarras, Jr. and A.R. Godwin. Univ. of Kansas Med. Ctr., Kansas City, KS.
- 564** B187 Using microarray analysis to search for HoxD targets in the developing limbs and genitalia of mice. J. Cobb, J. Zakany and D. Duboule. Univ. of Geneva, Switzerland.
- 565** B188 Paralogous Hox10 and Hox11 genes are required for global patterning of the mammalian skeletal system. D.M. Wellik and M.R. Capecchi. Howard Hughes Med. Inst. and Univ. of Utah, Salt Lake City.
- 566** B189 Direct interaction between Gli3 and Hoxd proteins alters the Sonic hedgehog pathway and skeletal patterning during limb development. Y. Chen, V. Knezevic, V. Ervin and S. Mackem. Natl. Cancer Inst., Natl. Inst. of Hlth., Bethesda, MD.
- 567** B190 GLI2 and GLI3 are required for SHH dependent sclerotome induction. L. Buttitta, C.C. Hui and C.M. Fan. Carnegie Inst. of Washington, Baltimore, MD and The Hosp. for Sick Children, Toronto, Ontario, Canada.
- 568** B191 The role of WNT/Beta-catenin in mammalian myogenesis. A.E. Chen and C. Fan. Carnegie Inst. of Washington, Baltimore, MD.
- 569** B192 Expression of tendon-related gene *Six1* and *Six2* in normal and *Lmx1b* knockout mice during limb development. T. Naruse, C.U. Pira and K.C. Oberg. Loma Linda Univ., Loma Linda, CA.
- 570** B193 Identification of Gli3 target genes by microarray analysis of the polydactylous mouse mutant, extra-toes. E.C. McGlinn, K. Lammerts van Bueren, A.M. Poh, B.J. Wainwright and C.A. Wicking. Univ. of Queensland, St. Lucia, Qld, Australia.
- 571** B194 Regulation of chondrocyte maturation by the transcription factor Nkx3.2/Bapx1. S. Provot, L.C. Murtaugh, H. Kempf, U-I. Chung, H. Kronenberg and A.B. Lassar. Harvard Med. Sch., Boston and Massachusetts Gen. Hosp., Boston.
- 572** B195 Smad-dependent transcriptional repression by Nkx3.2. D. Kim and A. Lassar. Harvard Med. Sch.
- 573** B196 Expression screen of transcription factors in the mouse metanephric kidney. J. Yu and A.P. McMahon. Harvard Univ., Cambridge, MA.
- 574** B197 Withdrawn
- 575** B198 Fgfr1 signalling regulates intermediate mesoderm patterning and subsequent urogenital development. M. Hytönen, N. Trokovic, H. Sariola, J. Partanen and K. Sainio. Univ. of Helsinki, Finland.
- 576** B199 Transcriptional control of terminal epithelial cell differentiation: insights from the bradykinin B2 receptor gene. Z. Saifudeen, J. Harrell, S. Dipp and S.S. El-Dahr. Tulane Univ., New Orleans, LA.
- 577** B200 Transcriptional activation of the BMP-responsive chick Nkx-2.5 homeobox gene in developing heart. K-H. Lee, S. Evans and A.B. Lassar. Children's Hosp. Boston, Harvard Med. Sch.
- 578** B201 Tbx-5 is required for the development and maturation of the murine cardiac conduction system. I.P.G. Moskowitz, A. Pizard, V. Patel, B. Bruneau, J. Kim, S. Kupersmidt, D. Roden, C. Berul, C.E. Seidman and J.G. Seidman. Harvard Med. Sch. and HHMI, Boston, Children's Hosp., Boston, The Hosp. for Sick Children, Toronto and Vanderbilt Univ. Med. Sch., Nashville, TN.



- 579 B202 Structure/function analysis of Mix.3/mixer and endoderm development. J.R. Doherty, H. Zhu and P.E. Mead. St. Jude Childrens Res. Hosp., Memphis, TN.
- 580 B203 Sox9, a novel pancreatic marker in *Xenopus*. Y. Lee and J. Saint-Jeannet. Sch. of Vet. Med., Univ. of Pennsylvania, Philadelphia.
- 581 B204 Withdrawn
- 582 B205 Analysis of oct-4 overexpression in the mouse isthmic organizer. V. Ramos-Mejia, D. Escalante-Alcalde, L. Ramirez, A. Nagy and H. Lomeli-Buyoli. Instituto de Biotecnologia, UNAM, Cuernavaca, Morelos and S. L. R. Inst., Toronto, Canada.
- 583 B206 Structure and functional analysis of novel cell death promoting protein Jpk using murine embryonic cell line. K-A. Kong, H-S. Kim, H. Park and M.H. Kim. Brain Korea Proj. for Med. Sci., Yonsei Univ. Col. of Med., Sodaemoongu Shinchondong, Seoul, Korea.
- 584 B207 Expression of a notch-class gene in teloblasts and blast cells of the leech *Helobdella robusta*, a segmented lophotrochozoan. A.S. Rivera and D.A. Weisblat. Univ. of California, Berkeley.
- 585 B208 Structure/function analysis of SHORTROOT (SHR) identifies a domain required for SHR movement. K. Gallagher, A. Paquette and P. Benfey. Duke Univ. and New York Univ.
- 586 B209 Searching for direct downstream targets of APETALA3 and PISTILLATA, Arabidopsis homeotic regulators of petal and stamen development. N. Nakayama, M. Zik and V. Irish. Yale Univ.
- 587 B210 The MADS box gene *AGL42* is expressed in the *Arabidopsis* root meristem and maintains its organization. T. Nawy, J.E. Malamy and P.N. Benfey. New York Univ., Univ. of Chicago and Duke Univ.
- 588 B211 Rapid production of temperature sensitive mutants for functional analysis in vivo. Y. Eileen Shi, E. Engelhart and S.E. Bondos. Rice Univ., Houston, TX.
- 589 B212 Blood-specific expression of a novel zebrafish zinc finger protein. S. Sumanas, R. Dai and S. Lin. Univ. of California, Los Angeles.
- 590 B213 Estrogen RECEPTOR BETA  $\alpha$  (EP $\beta$  $\alpha$ ) and the estrogen pathway in zebrafish. C.S. Lassiter and E. Linney. Duke Univ. Med. Ctr., Durham, NC.
- 591 B214 Feedback mechanisms regulate retinoic acid production and degradation in the zebrafish embryo. B. Dobbs-McAuliffe, K. Yacisin, Q. Zhao and E. Linney. Duke Univ.
- 592 B215 Beyond genetics: how to purify soluble protein. S.E. Bondos and A. Bicknell. Rice Univ., Houston, TX.
- 593 B216 A screen to find signal dependent transcription factor(s) activating *knirps* expression in the L2 vein primordia. J.L. Trimble and E. Bier. Univ. of California San Diego.

## Morphogenesis

- 594 B217 Molecular control of vertebrate neural tube closure. J.B. Wallingford, S.L. Haigo and R.M. Harland. Univ. of California, Berkeley.
- 595 B218 FRL-1 is essential for neural differentiation in *Xenopus* early development. S-I. Yabe, K. Tanegashima, Y. Haramoto, S. Takahashi, T. Fujii, S. Kozuma, Y. Taketani and M. Asashima. Univ. of Tokyo.

- 596** B219 Localized expression of *drm/gremlin* in the central nervous system of the chick embryo. E. Huillard and M. Marx. UMR CNRS/Institut Curie, bbt, Ctr. Universitaire, ORSAY cedex, France.
- 597** B220 Role of SHH in the initiation of pituitary development in chick. L. Dufresne and A.K. Ryan. Montreal Univ. Hlth. Center.
- 598** B221 Genetic analysis of a neural tube defect mutant from ENU mutagenesis. T-H. Kim, K. Anderson and L. Niswander. HHMI, Sloan Kettering Inst., Cornell Univ., New York.
- 599** B222 *Cordon-bleu* is a conserved gene involved in neural tube formation. E. Carroll, D. Gerrelli, S. Gasca, E. Berg, D. Beier, A. Copp and J. Klingensmith. Duke Univ. Med. Ctr., Durham, NC; Neural Develop. Unit, Inst. of Child Hlth., London, UK; Samuel Lunenfeld Res. Inst., Mount Sinai Hosp., Toronto, Canada; Brigham and Womens Hosp., Boston, MA.
- 600** B223 Analysis of *limulus* and *wing-shaped neural plate*, two mouse mutants that display morphogenesis defects during late gastrulation. J.D. Lee and K.V. Anderson. Sloan-Kettering Inst.
- 601** B224 Participation of reactive oxygen species in motoneuronal death during spinal cord development. M.R. Sánchez-Carbente, L. Covarrubias and V. Narvéz-Padilla. Instituto de Biotecnología, UNAM. Fac. de Cien., UAEM. Cuernavaca, Morelos, Mexico.
- 602** B225 Programmed cell death is required for inner ear morphogenesis and growth. F. Cecconi, K.A. Roth, O. Dolgov, E. Munarriz, K. Anoukhin, P. Gruss and M. Salminen. Univ. of Rome "Tor Vergata", Italy, Univ. of Alabama at Birmingham, P. K. Anokhin Inst. of Normal Physiol. RAMS, Moscow, Russia, Max-Planck Inst. of Biophys. Chem., Goettingen, German and Univ. of Helsinki, Finland.
- 603** B226 Regulating dorsoventral polarity within the inner ear. M. Riccomagno, L. Martinu, S. Takada, D. Wu and D. Epstein. Univ. of Pennsylvania.
- 604** B227 The roles of mouse Fgfs and Fgfrs during early inner ear development. T.J. Wright, E. Hatch, H. Karabagli, P. Karabagli, R. Ladher, G.C. Schoenwolf and S.L. Mansour. Univ of Utah, Salt Lake City.
- 605** B228 Patterning of the semicircular canals are regulated by the sensory FGFs during chicken inner ear developement. W. Chang and D. Wu. Natl. Inst. on Deafness and Other Communication Disorders, NIH.
- 606** B229 Elucidating the timing of endothelin-a receptor function in neural crest cells using conditional gene inactivation. L-B. Ruest and D.E. Clouthier. Univ. of Louisville, KY.
- 607** B230 Ectopic *Fgf4* alters neural tube and neural crest development in the mouse embryo. N.A. Byrd, G. Smyth, G. Minowada and E.N. Meyers. Duke Univ. Med. Ctr., Durham and Case Western Reserve Univ. Sch. of Med., Cleveland, OH.
- 608** B231 Dissimilar regulation of cell differentiation in cranial and trunk neural crest cells. A. Abzhanov and C.J. Tabin. Harvard Med. Sch.
- 609** B232 Zebrafish *touchtone* is selectively required for neural crest-derived melanophore development. B. Arduini and P. Henion. Ohio State Univ., Columbus, OH.
- 610** B233 Wnt regulation of myogenic differentiation in the developing avian limb and face. L. Antoni, K. Anakwe, J. Hadley, D.J.R. Evans, L. Robson and P. Francis-West. King's Col., London, Queen Mary's Sch. of Med. and Dent., London and Cardiff Univ., UK.

- 611** B234 Role of Tbx-1 in chick craniofacial muscle development. R. Walker, J. Hadley, L. Antoni and P. Francis-West. King's Col., London.
- 612** B235 Pitx2 is involved in regulation of chick craniofacial and limb myogenesis. J. Hadley, L. Antoni, L. Robson and P. Francis-West. King's Col., London and Queen Mary's Sch. of Med. and Dent., London.
- 613** B236 Function of endogenous retinoids in craniofacial patterning. Y-P. Song and J.M. Richman. Fac. of Dent., UBC, Vancouver, CANADA.
- 614** B237 The orofacial cleft mutation *Dancer* disrupts T-box gene, Tbx10. J.O. Bush, K. Maltby and R. Jiang. Univ. of Rochester.
- 615** B238 Activin receptors IIa and IIb exhibit distinct roles in craniofacial development. R.C. Albertson, T.L. Payne-Ferreira and P.C. Yelick. Harvard Sch. of Dent. Med., Boston, MA.
- 616** B239 A somatic boundary is formed by two unidirectional signals acting Pto-anteriorly and ventro-dorsally. Y. Sato and Y. Takahashi. RIKEN, Ctr. for Develop. Biol., Kobe, Japan.
- 617** B240 Characterization of a zebrafish mutant that affects segmentation. W. Durst, C. Henry and S. Amacher. Univ. of California Berkeley.
- 618** B241 Notch and hedgehog signaling in zebrafish somite morphogenesis. C.A. Henry and S.L. Amacher. Univ. of California, Berkeley.
- 619** B242 Inhibition of the cell cycle is required for convergent extension of the paraxial mesoderm in *Xenopus*. W.F. Leise and P.R. Mueller. The Univ. of Chicago, Chicago, Illinois.
- 620** B243 Retinoic acid generated by Raldh2 in trunk mesoderm is a proximodistal morphogen for limb outgrowth. G. Duester and F.A. Mic. Burnham Inst., OncoDevelopmental Biol. Prog., North Torrey Pines Rd., La Jolla, CA.
- 621** B244 Retroviral expression of IGF binding protein 2 in chick embryo limbs suggests involvement in endochondral bone formation. M.C. Fisher, C. Meyer and C.N. Dealy. Univ. of Connecticut Hlth. Ctr., Farmington, CT.
- 622** B245 Role of EGF signaling in chick limb development. M. Omi, N.J. Maihle and C.N. Dealy. Univ. of Connecticut Hlth. Ctr., Farmington, CT and Mayo Clin., Rochester, MN.
- 623** B246 Tbx genes specify Pior digit identity through Shh and BMP signaling. T. Suzuki, J. Takeuchi, K. Koshiba-Takeuchi and T. Ogura. Nara Inst. of Sci. and Technol., Japan.
- 624** B247 Limb development in *doubleridge*, a new Dkk1 hypomorph. M. Adamska, B.T. MacDonald and M.H. Meisler. Univ. of Michigan, Ann Arbor.
- 625** B248 Hypomorphic expression of *Dickkopf-1* in the *doubleridge* mouse mutant. B.T. MacDonald, M. Adamska and M.H. Meisler. Univ. of Michigan, Ann Arbor, MI.
- 626** B249 Dach1 is a novel nuclear BMP antagonist required for AER maintenance and transcriptional repression of Meis2 during proximodistal axis formation of limb bud. Y. Kida and T. Ogura. Nara Inst. of Sci. and Technol., Nara, Japan.
- 627** B250 Out of bounds, a mouse mutant with defective apical ectodermal ridge (aer) compaction resulting in patterning defects along the ap, dv and pd axes. S.D. Weatherbee, K.V. Anderson and L.A. Niswander. HHMI, Sloan Kettering Inst., New York, NY.

- 628** B251 Cilia and limb patterning. Q. Zhang, N.S. Murcia and B.K. Yoder. Univ. of Alabama at Birmingham and Case Western Reserve Univ.
- 629** B252 Indistinguishable forelimb dysmorphogenesis induced by ethanol and by retinoic acid (RA) signaling antagonism or RA synthesis inhibition provide clues regarding ethanol's teratogenic mechanism. C.S. Johnson, K.K. Sulik and E.S. Hunter III. UNC-Chapel Hill and US EPA, RTP, NC.
- 630** B253 Functional analysis of BMP3 in mice and frogs. L. Gamer, J. Nove and V. Rosen. HSDM and Forsyth Inst., Boston, MA.
- 631** B254 Tenomodulin is specifically expressed in dense connective tissue. C. Shukunami, A. Takimoto, M. Kakuwana and Y. Hiraki. Inst. for Frontier Med. Sci., Kyoto Univ.
- 632** B255 Beyond vertebrates: distribution and differentiation of cephalopod cartilage. A.G. Cole and B.K. Hall. Dalhousie Univ.
- 633** B256 FGF/FGFR2 Signaling in mandibular morphogenesis. B. Havens, A. Liddell, P. Murthy, B. Rodgers and M. Mina. Sch. of Dent. Med., Univ. of Connecticut Hlth. Ctr., Farmington, CT.
- 634** B257 RAR alpha regulation of distal lung differentiation. C. Wongtrakool, S. Malpel, J. Gorenstein, J. Sedita, M. Ramirez, M. Underhill and W.V. Cardoso. Boston Univ. Sch. of Med.; Sch. of Dent. and Univ. of Western Ontario, London, Ontario.
- 635** B258 Heparan sulfates expressed in the distal lung are required for fgf10 binding to the epithelium and for airway branching. K.I. Izvolsky, L. Zhang, L. Wei, Q. Yu, M.A. Nugent and W.V. Cardoso. Boston Univ. Sch. of Med.
- 636** B259 Cathepsin H, a FGF10 target in the developing lung. J. Lu, K. Izvolsky, X. Qi, D. Keppler and W. Cardoso. Boston Univ. Sch. of Med. and LSU-HSC, Sch. of Med., Shreveport, LA.
- 637** B260 The interaction of a novel xin protein with  $\beta$ -catenin at the adherens junction of the intercalated discs in developing hearts. E. Gustafson-Wagner, S. Jaacks, H. Sinn, J.L.-C. Lin and J.J.-C. Lin. Univ. of Iowa.
- 638** B261 Morphogenesis of the zebrafish liver and pancreas. H.A. Field, E.A. Ober, D. Dong and D.Y.R. Stainier. Univ. of California, San Francisco.
- 639** B262 Analysis of fear of intimacy: A novel gene involved in gonad formation. W. Mathews and M. Van Doren. Johns Hopkins Univ.
- 640** B263 Disturbed expression of Sox9 in presertoli cells underlies B6.ytir sex-reversed mouse gonads. N. Moreno-Mendoza, L. Torres-Maldonado and H. Merchant-Larios. Instituto de Invest. Biomédicas, UNAM, Mexico.
- 641** B264 MEK1 signaling is primordial for normal murine placental morphogenesis. B. Vickram and C. Jean. Ctr. de Recherche de LHttel Dieu de Québec, CHUQ, QC, Canada.
- 642** B265 Formation of the chorioamniotic membrane (ChorAm) in chick embryos. Y. Evrard, R. Pulver and B. Holton. Univ. Wisconsin Oshkosh.
- 643** B266 COBRA, a GPI-anchored membrane protein, regulates anisotropic cell expansion during *Arabidopsis* development. F. Roudier, A. Fernandez and P.N. Benfey. Duke Univ. and New York Univ.

- 644 B267 Electrical controls of regeneration in planaria. T. Nogi and M. Levin. The Forsyth Inst.
- 645 B268 The role of microtubules in *Xenopus* convergent extension. K.M. Kwan and M.W. Kirschner. Harvard Med. Sch., Boston, MA.
- 646 B269 Characterization of chicken NF2/merlin indicates potential roles in growth regulation and cell migration. Y. Chen, D.H. Gutmann, C. Haipek, M. Bronner-Fraser and C.E. Krull. Univ. of Missouri-Columbia; Washington Univ. Sch. of Med.; California Inst. of Tech.
- 647 B270 Defective convergence in half-baked gastrulae. D.A. Kane, K.N. DelKanic and R.M. Warga. Univ. of Rochester, Rochester, NY.
- 648 B271 PAR proteins are required for cell adhesion and gastrulation in *C. elegans* embryos. J. Nance and J.R. Priess. FHCRC and HHMI, Seattle, WA.
- 649 B272 Integrins modulate Sog activity during *Drosophila* development. H. Araujo, E. Negreiros, M. Fontenelle and E. Bier. Fed. Univ. of Rio de Janeiro- UFRJ and Univ. of California at San Diego.
- 650 B273 Hedgehog signaling regulates cell proliferation and differentiation in pharyngeal cartilages. L.P. Hernandez and S.H. Devoto. George Washington Univ. and Wesleyan Univ.
- 651 B274 Position-specific responsiveness to jaw identity signals RA and noggin. J.M. Richman. UBC, Vancouver, Canada.
- 652 B275 Apoptosis plays a role in removal of the first and second aortic arch arteries, in remodeling of the thyroid rudiment and in rupture of closing plates in chick embryos. S.J. Klemperer and S.A. Miller. Hamilton Col., Clinton, NY.
- 653 B276 Moe, a novel FERM-domain containing protein required for tight junction formation. A. Jensen and M. Westerfield. Univ of Massachusetts-Amherst Univ. of Oregon.
- 654 B277 Coming undone: cadherins and early morphogenesis. K.N. DelKanic and D.A. Kane. Univ. of Rochester, NY.
- 655 B278 Genetic mapping and characterization of the m196 mutation in zebrafish. R. McBride, M. Montero, S. Sachdev, E. Knapik and M-A. Akimenko. Ottawa Hlth. Res. Inst., Univ. of Ottawa, Canada and Univ. Freiburg, Germany.
- 656 B279 Functional analysis of zebrafish c-met receptor tyrosine kinase during embryogenesis. J.R. Jessen and L. Solnica-Krezel. Vanderbilt Univ., Nashville, TN.
- 657 B280 Functional analysis of a zebrafish PDZ-RhoGEF. J.L. Ray, J.R. Jessen and L. Solnica-Krezel. Vanderbilt Univ., Nashville, TN.
- 658 B281 Death is the major fate of medial edge epithelial cells of secondary palate shelves and the cause of basal lamina degradation during their fusion. L. Covarrubias and R. Cuervo. UNAM, Cuernavaca, Mor., Mexico.
- 659 B282 Mechanisms underlying the robustness of morphogen gradients. A.D. Lander, S. Kim, Q. Nie and F.Y.M. Wan. Univ. of California, Irvine.

## Cell Motility and Guidance

- 660 B283 Genetic integration of semaphorin/ephrin signaling controls cell sorting and guidance during epidermal morphogenesis in *C. elegans*. R. Ikegami and J. Culotti. Mt. Sinai Hosp.

- 661** B284 Investigating the role of Eph/ephrin-A during trigeminal ganglion axon guidance. C.S. Jayasena and S.A. Koblar. ARC Ctr. for the Molec. Genet. of Develop. (CMGD), Sch. of Molec. and BioMed. Sci., Univ. of Adelaide, Australia.
- 662** B285 Axon guidance during neural regeneration in planarians: characterization of netrin and netrin receptor homologues. F. Cebria, K. Agata and P.A. Newmark. Univ. of Illinois at Urbana-Champaign and RIKEN Ctr. for Develop. Biol., Kobe, Japan.
- 663** B286 Analysis of molecular guidance cues directing axon extension from the ventral cochlear nucleus. D.M. Howell, A.S. Berrebi, G.A. Spirou and P.H. Mathers. West Virginia Univ. Sch. of Med., Morgantown.
- 664** B287 Hypomorphic and normal expression of a point mutated NMHC II-B results in distinct phenotypes in mice. X. Ma, S. Kawamoto and R.S. Adelstein. LMC/NHLBI/NIH.
- 665** B288 Slit1a is required for optic tract development in the zebrafish. L.D. Hutson, S-Y. Yeo, H. Okamoto and C-B. Chien. Univ. of Utah Med. Ctr., Salt Lake City and Brain Sci. Inst., RIKEN, Wako-Shi, Japan.
- 666** B289 Defining the cellular and molecular architecture of the Zebrafish chiasm region. M. Barresi, E. Swindell, N. Hopkins, J. Shin, H. Park, B. Appel and R. Karlstrom. Univ. of Mass., Amherst, MIT and Vanderbilt Univ.
- 667** B290 Zebrafish *topped* is functioning in a subset of fast muscle cells to allow stereotyped axon outgrowth. L. Rodino-Klapac and C.E. Beattie. The Ohio State Univ., Columbus OH.
- 668** B291 A vertebrate homolog of the *Dumpy19* gene may have a role in radial cell migration. L. King, N. Milanese and Y. Zou. Univ. of Chicago, Chicago, IL.
- 669** B292 Identification of neurotactin as a dominant enhancer of the Ablason tyrosine kinase mutant phenotype. M.A. Seeger, R.G. Rowe, D.J. Forsthoefel, A. Stammer, E. Bishop, X-Y. Liu and E-C. Liebl. Ohio State Univ. and Denison Univ.
- 670** B293 Theseus, an orphan G-protein coupled receptor, is required for Transepithelial Migration of *Drosophila* germ cells. P.S. Kunwar, M. Starz-Gaiano, R. Baintion, U. Heberlein and R. Lehmann. Skirball Inst., HHMI, NYU Med. Ctr. and Univ. of California, San Francisco.
- 671** B294 Signalling downstream of guidance receptors in border cell migration. C.M. Luque, T. Fulga, P. Duchek, P. Klingbeil and P. Rorth. EMBL, Heidelberg, Germany.
- 672** B295 Regulation of border cell migration by effectors of the EGFR pathway. L.-M. Pai, P.-Y. Wang and I.-C. Lee. Chang Gung Univ., Taiwan.
- 673** B296 Re-evaluating the role of matrix during convergence and extension in *Xenopus* gastrulation: fibronectin integrin interactions mediate cell protrusive behavior during mediolateral cell intercalation. L.A. Davidson, D.W. DeSimone and R. Keller. Sch. of Med., Univ. of Virginia Hlth. Syst., Charlottesville, Univ. of Virginia, Charlottesville, VA.
- 674** B297 Expression of a human caldesmon fragment defective in Ca<sup>2+</sup>/calmodulin binding sites interferes with the dynamics of actin filaments and affects motile behaviors. Y. Li, J.L-C. Lin, R.S. Reiter and J.J-C. Lin. Univ of Iowa.
- 675** B298 The p120 catenin regulates morphogenetic movements in early *Xenopus* embryos by modifying the activity of the Rho-family small GTPases. M. Ciesiolka, M. Delvaeye, G. van Imschoot, F. van Roy and K. Vleminckx. Ghent Univ., Belgium.

- 676** B299 Isolation and characterization of reticulon (RTN) and Nogo proteins in *Xenopus laevis*. S. Shim, E.C. Park, G. Cho and J. Han. Pohang Univ. of Sci. and Technol., Pohang, Republic of Korea.
- 677** B300 PINCH mediates a syndecan-2: $\beta$ 1-integrin complex that drives fibronectin fibrillogenesis and cell migration during *Xenopus* gastrulation. K.L. Kramer, E.M. Prewitt, J.E. Barnette, M. McGrail, M.C. Beckerle and H.J. Yost. Univ. of Utah, Salt Lake City.
- 678** B301 Roles of WASp related proteins in dictyostelium discoidium development. D. Caracino, C. Jones, J. Steiner and C.L. Saxe III. Emory Univ., Atlanta, GA.

## Cell-Cell Signaling

- 679** B302 Cleavage at the S2 site of BMP-4 is regulated in a pH-dependent fashion. C. Degnin, G. Thomas and J. Christian. Oregon Hlth. and Sci. Univ., Portland.
- 680** B303 BMP signaling to the AER is required for interdigital cell death during limb development. S. Pajni Underwood, C. Wilson, Y. Mishina and M. Lewandoski. CCR, NCI-Frederick/NIH and NIES/NIH.
- 681** B304 Crossveinless 2 is required for BMP signaling during *Drosophila* crossvein development. A. Ralston, M. Serpe, D.J. Olson, M.C. Halloran, M.B. O'Connor and S.S. Blair. Univ. of Wisconsin, Madison and Univ. of Minnesota, Minneapolis, MN/HHMI.
- 682** B305 Modulation of Wnt and BMP signals by hip (hedgehog interacting protein)-mediated inhibition of hedgehogs in murine intestine. B. Madison, K. Braunstein and D. Gumucio. Univ. of Michigan.
- 683** B306 Purified Wnt proteins influence cell proliferation and differentiation in high density limb bud mesenchyme micromass cultures. D. ten Berge and R. Nusse. Stanford Univ. Sch. of Med., Stanford, CA.
- 684** B307 Mechanism of Dickkopf anti-Wnt action. M. Semenov and X. He. Children's Hosp./Harvard Med. Sch., Boston, MA.
- 685** B308 Using TAP technology and proteomics to identify novel modulators of the Notch signaling pathway. A. Veraksa, A. Mukherjee, A. Bauer and S. Artavanis-Tsakonas. MGH Cancer Ctr., Harvard Med. Sch., Charlestown, MA and Cellzome AG, Heidelberg, Germany.
- 686** B309 What does a Notch1 residual processing allele teach us about Notch signaling mechanisms? S. Huppert, A. Nichols, D. Pooran and R. Kopan. Washington Univ. Sch. of Med.
- 687** B310 Induction of neural crest in *Xenopus* embryos by Notch and Xiro1. A. Glavic, F. Silva, M.J. Aybar and R. Mayor. Millennium Nucleus Develop. Biolgy, Fac. de Cien., Univ. de Chile.
- 688** B311 Notch signaling in the *C. elegans* embryo: suppression and enhancement of the aph-1 mutant phenotype. S.O. Yeboah, E.M. Guzman, V.A. Hale and C. Goutte. Amherst Col., Amherst, MA.
- 689** B312 Nodal, an early micromere signal that affects endomesoderm specification. V.L. Flowers, G. Courteau, D. McClay and J.M. Venuti. LSU Hlth. Sci. Ctr., New Orleans, LA and Duke Univ., Durham, NC.
- 690** B313 Extracellular regulation of Nodal signaling during mouse embryogenesis. M.M. Shen, C. Chen, J. Chu, J. Ding, S. Price and Y-T. Yan. UMDNJ-Robert Wood Johnson Med. Sch., Piscataway, NJ.
- 691** B314 Mechanisms of FGFR1 signaling during mouse embryogenesis. R.V. Hoch and P. Soriano. FHCR, Seattle, WA.

- 692** B315 Withdrawn
- 693** B316 Ext1 regulates chondrocyte differentiation. L. Koziel, M. Kunath, O. Kelly, B. Skarnes and A. Vortkamp. Max-Planck-Inst. for Molec. Genetics.
- 694** B317 Role of Fat in regulation of cell proliferation and planar cell polarity. X. Zhao, C-H. Yang and M.A. Simon. Stanford Univ.
- 695** B318 The zebrafish *belladonna* mutation is required for axon guidance and cell differentiation in the forebrain. A. Seth, J.A. Culverwell, M. Walkowicz and R. Karlstrom. Univ. of Massachusetts, Amherst.
- 696** B319 Dysregulated expression of p21(CIP1) and PCNA in lungs lacking the epithelial type I cell gene T1alpha links type I cell differentiation to cell cycle control in distal lung during alveolus formation. G. Millien, A. Hinds, J. Wang, Y.X. Cao, M.C. Williams and M.I. Ramirez. Boston Univ. Sch. of Med.
- 697** B320 The signaling protein Jelly belly specifies visceral muscle progenitors through the receptor tyrosine kinase Alk and the Ras/MAPK pathway in *Drosophila*. H-H. Lee, A. Norris, J.B. Weiss and M. Frasch. Mount Sinai BiSch. of Med., New York, NY and Oregon Hlth. and Sci. Univ., Portland. ar
- 698** B321 Cloning and characterization of a novel *Drosophila* PDZ domain protein. S.Y. Kim, M. Renihan-McLaren and G. Boulianne. Hosp. for Sick Children, Toronto, Canada and Univ. of Toronto, Canada.
- 699** B322 Proteoglycan synthesis and function during early development of the vertebrate embryo. J. Larrinin, H. Carrasco, A. Leschot, J. Pablo Guzman, G. Olivares and M. Moreno. Ctr. for Cell Regul. and Pathology, P. Univ. Catolica de Chile, Santiago-Chile.
- 700** B323 Developmental expression of perlecan in the chick embryo. N. Soulintzi, A. Giakoumaki and N. Zagris. Univ. of Patras, Patras, Greece.
- 701** B324 Inhibitory effect of Sertoli cells on murine teratocarcinoma cell growth. P. Vecino, J.P. Gaillard and J. Arechaga. Univ. of the Basque Country, Lejona, Spain.
- 702** B325 A model to study stromal-epithelial sonic hedgehog signaling in prostate cancer. A. Shaw and W. Bushman. Univ. of Wisconsin-Madison.
- 703** B326 Disruption of maternal-fetal communication during pre-implantation embryogenesis in mice over-expressing the short form of p53. W. Gluba, A. Sutherland and H. Scrabble. Univ. of Virginia, Charlottesville, VA.
- 704** B327 Lrp5 and Ang2 are critical for developmentally programmed macrophage-induced cell death. S. Kurup, I. Lobov, J.E. Vallance, A. Korde, M. Patel, D. Glass, G. Karsenty and R.A. Lang. Cincinnati Children's Hosp. Med. Ctr., Baylor Col. of Med., Houston, TX.

2:45–3:15 pm: Break

3:15–5 pm: Panel Discussion Salon E

Embryonic and Adult Stem Cells: What Makes Them Different?

Chair: Brigid Hogan, Duke

Discussants: Meri Firpo, UCSF

Ron McKay, NINDS/NIH

James Sherley, MIT



5 pm: Dinner on each own

7–9 pm: Plenary Session II      Salons A–E

Migration and Guidance

Chair: Denise Montell, Johns Hopkins

- 705**      7:00      How cells sense chemoattractant gradients. P. Devreotes, E. Huang, M. Iijima, C. Janetopoulos and L. Chen. Johns Hopkins Univ. Sch. of Med.
- 7:30      Molecular mechanisms of motility in *Drosophila* border cells and human cancer cells. D. Montell, Johns Hopkins -
- 706**      8:00      Guidance of primordial germ cell migration by chemokine signalling. M. Doitsidou, M. Reichman-Fried, J. Stebler, J. Doerries, D. Meyer, C.V. Esguerra, T. Leung and E. Raz. Max Planck Inst. for Biophys. Chem., Goettingen, Univ. of Freiburg, and Mermaid Pharmaceut. GmbH, Falkenried, Hamburg, Germany.
- 8:30      Repellent axonal guidance cues and their modulation by chemokines and neurotransmitters. J. Raper, U Penn

9–11 pm: Poster Session II      University Hall

Odd number board authors present posters on 8/1, 9–11pm.

Even number board authors present posters on 8/2, 1–3pm.

## Saturday, August 2nd

8–8:45 am: Special Interest Programs at NIH      Salons A–D

Betsy Wilder, NIH

9–11 am: Plenary Session III      Salons A–E

Stem Cells in Development and Medicine

Chair: Doug Melton, Harvard

- 9:00      Stem cells for pancreatic development. D. Melton, Harvard
- 707**      9:30      Stem cells and lineage allocation in the early mouse embryo. J. Rossant, C. Chazaud, D. Strumpf, T. Kunath, L. Corson and Y. Yamanaka. Univ. of Toronto, Mount Sinai Hosp.
- 708**      10:00      Differentiation and genetic manipulation of human embryonic stem cells. N. Benvenisty. Hebrew Univ., Jerusalem, Israel.
- 10:30      Regulation of germline stem cells in *C. elegans*. J. Kimble, Univ. of Wisconsin-Madison

11–11:15 am: Break

11:15–11:45 am: Lifetime Achievement Award Lecture      Salons A–E

Ruth Lehmann, SDB President - Award Presentation to Shirley Tilghman

Lecture by S. Tilghman, Princeton Univ.

11:45 am–12:30 pm: Conklin Medal Lecture      Salons A–E

Doug Melton, SDB President-elect – Award Presentation to Allan Spradling

Early steps in oocyte formation. A. Spradling, Carnegie Institution of Washington

12:30 pm: Lunch on each own

1–3 pm: Poster Session II      University Hall  
 Odd number board authors present posters on 8/1, 9–11pm.  
 Even number board authors present posters on 8/2, 1–3pm.  
 Tear down posters at the end of the poster session.

2:30–3:00 pm: Break

### 3–5 pm: Concurrent Symposium IV

Symposium 10 - Sex and the Genome      Salons A–D

Chair: Barbara Meyer, UC Berkeley

- 3:00      Targeting the *C. elegans* dosage compensation complex to the X chromosome. B. Meyer, UC Berkeley
- 709**      3:25      Targeting of dosage compensation in *Drosophila* by noncoding roX RNAs. M.I. Kuroda, H. Oh and Y. Park. Baylor Col. of Med., Houston, TX and Harvard Med. Sch., Boston, MA.
- 710**      3:50      DM domains and sexual development. D. Zarkower. Univ. of Minnesota, Minneapolis.
- 711**      4:15      Sex-specific apoptosis regulates sexual dimorphism in the *Drosophila* somatic gonad. T. De Falco, G. Verney and M. Van Doren. Johns Hopkins Univ., Baltimore, MD.
- 712**      4:30      Xite, X-inactivation intergenic transcription elements that regulate the probability of choice. Y. Ogawa and J.T. Lee. Howard Hughes Med. Inst. Massachusetts Gen. Hosp. Harvard Med. Sch.

Symposium 11 - Development and Evolution      Salon E

Chair: Sean Carroll, Univ. Wisconsin-Madison

- 713**      3:00      Evolution in black and white? pigmentation pattern diversity in *Drosophila*. S.B. Carroll. HHMI, Univ. of Wisconsin-Madison.
- 714**      3:25      Evolutionary genetics and development of stripe loss in *Danio albolineatus*. R.R. Roberts, J. Manuel and D.M. Parichy. Univ. of Texas, Austin TX.
- 3:40      Regulatory landscapes in development and evolution. D. Duboule, Univ. of Geneva, Switzerland
- 715**      4:05      Dogfish Hox genes and the evolution of fin development. R. Freitas and M.J. Cohn. Univ. of Florida, Gainesville, FL.
- 4:20      Evolution and development of compound leaves. N. Sinha, UCSD
- 716**      4:45      The Evolution of Key Bilaterian Traits: Insights Into Axial Patterning and Mesoderm Formation from the Sea Anemone *Nematostella*, a non- Bilaterian Animal. J.R. Finnerty, K. Pang, P. Burton and M.Q. Martindale. Boston Univ. and Univ. of Hawaii.

Symposium 12 - From Synapse to Behavior      Salons H–K

Chair: Tom Jessell, Columbia

- 3:00      Specification of motor neuron identity and connectivity. Tom Jessell, Columbia
- 717**      3:25      Gli3 antagonizes the Shh response in the developing spinal cord. N.P. Meyer and H. Roelink. Univ. of Washington.

- 3:40 Forward genetics and circadian clock genes in mammals. J. Takahashi, Northwestern
- 718** 4:05 Looking to Oogenesis to Learn about Fragile X Mental Retardation. T.A. Jorgens, A. Costa, T.C. Dockendorff, Y. Wang, K.K. Siwicki, A. Schgal and P. Schedl. Univ. of Pennsylvania, PA, Princeton Univ., NJ, Miami Univ., OH, Swarthmore Coll., HHMI.
- 4:20 Change of mind: Manipulating nervous system function with light. G. Miesenbock, Sloan Kettering
- 719** 4:45 Vax homeobox genes are fundamental regulators of neural retina precursor cells. S. Bertuzzi, M. Curradi, S. Mui, J.W. Kim and G. Lemke. Dulbecco Telethon Inst. at CNR-ITB, Segrate, Italy, Newron Pharmaceut., Gerenzano, Italy and The Salk Inst., La Jolla, CA.

6–10 pm: Awards Reception and Banquet

Best Poster Competition Awards – To be announced

End of SDB 62<sup>nd</sup> Annual Meeting official program

## Sunday, August 3rd

9 am–4 pm: NHLBI Satellite Symposium

Stem/progenitor Cells in Lung Morphogenesis, Repair and Regeneration

(Separate registration required, at no additional charge: [dwarburton@chla.usc.edu](mailto:dwarburton@chla.usc.edu))

Co-organizers: David Warburton, USC and Mary Anne Berberich, NHLBI

Local Organizer: Mary Sunday, Harvard

Confirmed Speakers:

Anne Bishop, Imperial College, London, UK - Alveolar epithelial cell differentiation from human ES cells

Barbara Driscoll, Childrens Hospital Los Angeles Research Institute - Resident alveolar epithelial progenitor/stem cells

Allan Fine, Boston University - Stem cell uptake in lung injury

Connie Hsia, U Texas Southwestern - Post-pneumectomy lung regeneration in dog

Diane Krause, Yale - Pneumocytes from bone marrow stem cells.

Darwin Prockop, Tulane - Progenitor cells for the lung: differentiation and cell fusion in an ex vivo cell culture system

Scott H. Randell, UNC-Chapel Hill - Tracheal stem cell niches

Mary Sunday, Harvard - Mesenchymal stem/progenitor cells and early lung embryogenesis

Barry Stripp, U. Pittsburgh - Stem/progenitor cells in the intrapulmonary conducting airways

Alice Tarantal, UC Davis - Gene delivery to the developing lung epithelium

David Warburton, USC - From little acorns great trees grow: how the laryngotracheal groove becomes a tennis court?

## ACKNOWLEDGMENTS

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